AFRL-VA-WP-TR-2006-3064

INTEGRATED HYPERSONIC
AEROTHERMOELASTIC METHODOLOGY
FOR TRANS ATMOSPHERIC VEHICLE
(TAV)/THERMAL PROTECTION SYSTEM
(TPS) STRUCTURAL DESIGN AND
OPTIMIZATION
Thermal Protection System Optimization
(TPSOPT)



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JANUARY 2006

Final Report for 27 September 2002 - 27 December 2005

This is a Small Business Innovation Research (SBIR) Phase II Report.

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PAO Case Number: AFRL/WS-05-1445, 07 Jun 2006

Structures Division

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/s/		
DAVID M. PRATT, PhD Technical Advisor		

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REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

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1. REPORT DATE (DD-MM-YY)	REPORT DATE (DD-MM-YY) 2. REPORT TYPE							
January 2006	Final	09/27	7/2002 – 12/27/2005					
4. TITLE AND SUBTITLE		5a.	CONTRACT NUMBER					
INTEGRATED HYPERSONIC AF	GY	F33615-02-C-3213						
	HICLE (TAV)/THERMAL PROTECTION	ON 5b.	GRANT NUMBER					
SYSTEM (TPS) STRUCTURAL D		5c.	PROGRAM ELEMENT NUMBER					
Thermal Protection System Optimize	zation (TPSOPT)		0602201					
6. AUTHOR(S)		5d.	PROJECT NUMBER					
P.C. Chen, X.W. Gao, and K.T. Ch.	ang		A01T					
		5e.	TASK NUMBER					
		5f.	5f. WORK UNIT NUMBER					
			0E					
7. PERFORMING ORGANIZATION NAME(S) AI	ND ADDRESS(ES)	-	PERFORMING ORGANIZATION REPORT NUMBER					
ZONA Technology, Inc.		'	REPORT NUMBER					
9489 E. Ironwood Square Drive								
Suite 100								
Scottsdale, AZ 85258-4578								
9. SPONSORING/MONITORING AGENCY NAM	E(S) AND ADDRESS(ES)	10.	SPONSORING/MONITORING AGENCY					
Air Vehicles Directorate			ACRONYM(S)					
Air Force Research Laboratory			AFRL/VASD					
Air Force Materiel Command		11.	SPONSORING/MONITORING AGENCY					
Wright-Patterson AFB, OH 45433-	7542		REPORT NUMBER(S) AFRL-VA-WP-TR-2006-3064					

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

This is a Small Business Innovation Research (SBIR) Phase II Report. PAO Case Number: AFRL/WS-05-1445, 07 Jun 2006. Report contains color.

14. ABSTRACT

This report was developed under a SBIR contract.

The objective of this project was to develop a hypersonic aerothermoelastic methodology that optimizes the Thermal Protection System (TPS) for the Trans Atmospheric Vehicles (TAV) in the re-entry/maneuver flight phases. The outcome of this project is a Thermal Protection System Optimization (TPSOPT) software system that integrates multiple disciplines, including the hypersonic aerodynamics, aerothermodynamics, heat transfer, aeroelasticity, with an automatic optimization technique for the minimum weight design of the TPS while subjected to the temperature constraints. A proper orthogonal decomposition and response surface method (PODIRSM) has also been integrated into the TPSOPT system to accelerate the aerodynamic data generation process. There are three manuals generated for the TPSOPT, namely the TPSOPT Theoretical Manual, the TPSOPT Users Manual and the TPSOPT Applications Manual. The design capability of the TPSOPT system is demonstrated on two wing-body configurations including the X-34 and Micro-X vehicles and is documented in the TPSOPT Applications Manual. In addition, a ZONAIR-Adaptive Modeling Environment (ZONAIR-AME) using the Adaptive Modeling Language (AML) was developed by TechnoSoft, Inc. ZONAIR-AME is expedient aerodynamic mesh generation tool that allows varying of parametric geometry for rapid assessment of aerodynamic design concept.

15. SUBJECT TERMS

SBIR Report, Thermal Protection System, Aerothermoelastic Methodology, Hypersonic Aerodynamics, Aerothermodynamics, Structural design/optimization, Integrated Software System, Proper Orthogonal Decomposition, Response Surface Method

16. SECURITY CLASSIFICATION OF:			17. LIMITATION	18. NUMBER	19a. NAME OF RESPONSIBLE PERSON (Monitor)
	b. ABSTRACT Unclassified		OF ABSTRACT: SAR	OF PAGES 248	Amarshi A. Bhungalia 19b. TELEPHONE NUMBER (Include Area Code) (937) 255-8450

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Foreword

The Contract No. F33615-02-C-3213, entitled, "Integrated Hypersonic Aerothermoelastic Methodology for TAV/TPS Structural Design and Optimization," was initiated by the United States Air Force Research Laboratory of the Air Force Wright-Patterson AFB. The contract's objective is to develop a hypersonic aerothermoelastic methodology that optimizes the Thermal Protection System (TPS) for the Trans Atmospheric Vehicles (TAV) in the re-entry/maneuver flight phases.

ZONA Technology participants on the subject contract include: Danny Liu, as the program manager; P.C. Chen, as the principal investigator; Xiaowei Gao, as the project engineer; and Reggie Chang, as the project engineer. Hilmi Kamhawi, of TechnoSoft, Inc. as the subcontractor was responsible for the ZONAIR-AME development (Manual IV). The AFRL sponsors are: Amar Bhungalia, amarshi.bhungalia@wpafb.af.mil. This final report covers all technical tasks completed on the contract from its initiation on 27 September 2002 through 27 December 2005.

1.0 INTRODUCTION

1.1 What is TPSOPT

TPSOPT is a software system to design a Thermal Protection System (TPS) on the surface of a hypersonic flight vehicle. It employs an automatic optimization technique to minimize the total weight of the TPS which is subjected to the temperature constraints at each layer of the TPS.

1.2 Background

Current Trans-Atmospheric Vehicle (TAV) design requires aerothermoelastic analysis to ascertain the TAV/TPS structural integrity in extreme hypersonic environments. More urgently, it is required to develop and integrate maturing technologies in key areas, such as hypersonic aerodynamics/aeroheating, propulsion, structures and integrated vehicle systems preferably in a Multidisciplinary Design/analysis Optimization (MDO) manner. In response to these programs, it is required to identify technologies needed to create a new, safe, cost-effective launch system thus to generate an integrated technology plan.

To develop a comprehensive aerothermoelastic program for Reusable Launch Vehicle (RLV)/TPS design requires careful planning of the required disciplines. It appears that thus far all required disciplines have been developed individually to a large extent including the trajectory analysis, the TPS sizing analysis, the thermal/structure analysis and the aerodynamic/aerothermodynamic programs. Thus, to integrate these programs into an efficient MDO procedure is a challenging task. Because the disparate analysis disciplines and their adopted methodologies being at different levels, these programs could not readily constitute a viable RLV/TPS design process. There are many stumbling blocks in achieving this integration task. For example, the low computational efficiency of the high fidelity aerodynamic/surface temperatures would prevent sufficient iterations in the design cycles. The interface between the surface temperature calculations and the structural heat transfer appears to be underdeveloped. Note that the temperature calculation is driven by trajectory analysis and high-fidelity aerodynamic computation; whereas the structural heat transfer analysis is driven by the thermal properties of the TPS and primary structure. Finally, the primary structural loads must be kept synchronized with the structural temperature distributions in order to ensure the primary structure is capable of bearing the in-flight launch loads and re-entry/maneuver loads.

Therefore, for an expedient integrated aerothermodynamics/aerothermoelastic design methodology we realize that a unified hypersonic panel method with high-fidelity aerodynamic surface-compliant panels must be employed. Thus, these panels could be tightly coupled with a structural FEM (Finite Element Method) module such as ASTROS* (Automated STRuctural Optimization Systems), or NASTRAN for an aerodynamic/structural interface in order to ensure a proper MDO procedure. On the other hand, any high-level CFD method would not be suitable as a rapid design tool under the proposed environment. Clearly, for an expedient, high-fidelity aerothermoelastic/aerothermodynamic program, a compatible hypersonic aerodynamic methodology is warranted. ZONAIR is a unified hypersonic/supersonic panel method that

satisfies all requirements and is proven computationally efficient with comparable accuracy to CFD/Euler solutions.

The TPSOPT software system carries out an integrated hypersonic aerothermoelastic methodology for TAV/TPS design/optimization (see TPSOPT Theoretical Manual), which focuses on the hypersonic aerothermoelastic method development and its design/optimization compatibility. It integrates multiple disciplines, including Aerodynamics, Aerothermodynamics, Heat Transfer, Aeroelasticity and Structure Optimization, to design a Thermal Protection System (TPS) on the surface of a hypersonic flight vehicle.

1.3 TPSOPT Formulation

TPSOPT is optimization software which covers multiple discipline knowledge, such as aerodynamics, heat transfer, and size optimization. The aerodynamics task is conducted by ZONAIR, the heat transfer part is implemented by SHABP and MINIVER/EXITS, and the size optimization is performed by the formulation derived in the completion of the Air Force Phase II project. The following is a brief description of the typical formulation (for details go to the TPSOPT Theoretical Manual).

1.3.1. Aerodynamic formulation in ZONAIR

The governing equation used in ZONAIR is the Prandtl-Glauert equation which can be expressed as

$$\left(1 - M_{\infty}^{2}\right) \phi_{xx} + \phi_{yy} + \phi_{zz} = 0 \tag{1.1}$$

where:

 M_{∞} is the freestream Mach number and for incompressible flow ($M_{\infty} = 0$).

 ϕ is the velocity potential.

Applying Green's theorem to Eq 1.1, an integral solution for a point p can be obtained:

$$\phi(P) = -\frac{1}{4\pi} \iint_{S+S_w} \left[\sigma(Q) \frac{1}{\overline{R}} - \mu(Q) \vec{n} \cdot \nabla(\frac{1}{\overline{R}})\right] dS$$
 (1.2)

where:

 σ is the source singularity distribution on the configuration S.

 μ is the doublet singularity distribution on the configuration S and the wake surface S_w .

 \vec{n} is the out-normal vector.

 $\vec{R} = |\vec{P} - \vec{Q}|$ is the distance between the point P and Q.

The boundary condition requires the flow to be tangential only to a moving body, i.e.:

$$\vec{\mathbf{n}} \cdot \nabla \phi = -\vec{\mathbf{n}} \cdot \vec{V}_{\infty} \tag{1.3}$$

1.3.2 Heat transfer formulation in MINIVER/EXITS

The heat conduction equation used in EXITS for an isotropic material with one special dimension is:

$$\rho c_p \frac{\partial T}{\partial t} = k \frac{\partial^2 T}{\partial x^2} \tag{1.4}$$

where

T is the temperature

T is the time

 ρ is the density

 c_p is the specific heat

k is the thermal conductivity

The finite difference method is used to solve equation (1.4). For three adjacent discretized points x_1 , x_0 and x_2 separated with spaces Δx_1 and Δx_2 , the second derivative of the temperature at time step n can be expressed as

$$\left. \frac{\partial^2 T}{\partial x^2} \right|_0^n = \frac{2}{\Delta x_1 + \Delta x_2} \left[\frac{T_1^n \Delta x_2 + T_2^n \Delta x_1 - T_0^n (\Delta x_1 + \Delta x_2)}{\Delta x_1 \Delta x_2} \right] \tag{1.5}$$

where T_1 , T_0 and T_2 are temperatures at the three points.

The forward difference approximation is taken for the time derivative as shown below

$$\frac{\partial T}{\partial t} = \frac{T_0^{n+1} - T_0^n}{\Delta t} \tag{1.6}$$

and substitute into equation (1.4) it follows that

$$T_i^{n+1} = T_i^n \left(1 - \frac{\Delta t}{C_i} \sum_j K_{ij} \right) + \frac{\Delta t}{C_i} \sum_j K_{ij} T_j^n$$
(1.7)

where

$$V_i = \frac{\Delta x_1 + \Delta x_2}{2} \tag{1.8}$$

$$C_i = \rho c_p V_i \tag{1.9}$$

$$K_{ij} = \frac{k}{\Delta x_{ij}} \tag{1.10}$$

The temperature can be solved by an iterative procedure using equation (1.7).

1.3.3 Size optimization

Size optimization is performed by minimizing the total weight of the vehicle surface. To do this, the following objective function is defined for a TPS consisting of L layers.

$$F = \sum_{l=1}^{L} \sum_{p=1}^{P} A_{p} \rho_{p}^{l} h_{p}^{l}$$
 (1.11)

where

 A_p is the area of the panel p

 ρ_p^l is the density of the panel p on layer l

 h_p^l is the thickness of the panel p on layer l

L is the number of layers

P is the number of all panels over the patch

The thickness h_p^l of each layer can be expressed with the thickness of element nodes using shape functions as

$$h_{p}^{l} = \sum_{\alpha=1}^{M_{l}} N_{\alpha}^{l}(\xi_{p}, \eta_{p}) h^{\alpha l}$$
 (1.12)

where

 $h^{\alpha l}$ is the thickness of node α on layer l

 $N_{\alpha}^{l}(\xi_{p},\eta_{p})$ is the value of shape function α on layer l for panel p

 ξ_p and η_p is the intrinsic coordinates of panel p

 M_1 is the number of element nodes on layer l

The shape functions $N_{\alpha}^{l}(\xi_{p},\eta_{p})$ can be found in the TPSOPT Theoretical Manual. The objective function F shown in equation (1.11) is subjected to the Thickness constraints:

$$H_{\min}^{l} < h_{p}^{l} < H_{\max}^{l} \tag{1.13}$$

and the temperature constraints:

$$T_{nms}^{\beta} < T_{max}^{\beta} \tag{1.14}$$

where

 H_{\min}^{l} and H_{\max}^{l} is the allowable minimum and maximum thickness for layer l is the temperature of hot panel n on the side s for trajectory m at the heat point β is the allowable maximum temperature of layer heat point β

This optimization problem can be solved by linking a TPS analysis code such as the MINIVER/EXITS module with an optimization driver like the usable/feasible direction method imbedded in ADS.

1.4 Operational Procedure of Using the TPSOPT System

To apply the TPSOPT system to design a TPS a two-step procedure should be followed. The first step is to prepare data and run ZONAIR, and the other is to use the TPSOPT software. Figure 1.1 is a skeleton of the two steps. Following the figure are detailed descriptions of the steps.

$$\begin{cases} Mach \ list \\ Angle \ of \ attack \ list \end{cases} \Rightarrow \begin{cases} AEROGEN \ bulk \ data \ cards \\ INPCFD \ bulk \ data \ cards \ (optional) \end{cases}$$

$$Input \begin{cases} Control \ table \ file \ name \\ Geometry \ file \ name \\ Flow \ field \ file \ name \end{cases} \Rightarrow GENBASE \ bulk \ data \ cards \\ Flow \ field \ file \ name \end{cases}$$

$$\begin{cases} Control \ table \ file \ containing \ mach \ numbers, \ angles \ of \ attack \ and \\ flow \ field \ file \ names \end{cases}$$

$$Geometry \ file \ containing \ grid \ coordinates \ and \ panel \ connectivity \\ Flow \ field \ files \ containing \ velocities \ and \ C_p$$

Activate Control table file using ASSIGN AEROBASE = 'Control table file name'

Design panels using DESVAR bulk data cards
Hot panels using PANLST2 bulk data cards
Thickness panels using PANLST2 bulk data cards
Thermal structure types using STTYPE bulk data cards

Setup Trajectory time history using TRAJCT bulk data cards

Perform FEM temperature mapping (optional) using FEM bulk data cards

Figure 1.1. Outline of two-step procedure to use TPSOPT

Step 1: Run ZONAIR to Setup Aerodynamic Database Files

To setup aerodynamic database files which are necessary input information to run TPSOPT, the aerodynamic software ZONAIR is first executed for different combinations of Mach number, M, and angle of attack, α . The ZONAIR input geometry model should cover the whole surface of the TPS to be designed. The aerodynamic database files will be generated according to the combination sequence of the Mach number and angle of attack by using the ZONAIR input bulk data card AEROGEN. The AEROGEN cards are numbered in ascending order for both Mach number and angle of attack. For example, Table 1.1 shows the case of 5 Mach numbers (2, 4, 6, 8, 10) and 4 angles of attack (0, 4, 7, 10).

Table 1.1. Combination of 5 Mach numbers and 4 angles of attack

AEROGEN Card Number	M	α
1	2.0	.0
2	4.0	.0
3	6.0	.0
4	8.0	.0
5	10.	.0
6	2.0	4.0
7	4.0	4.0
8	6.0	4.0
9	8.0	4.0
10	10.	4.0
11	2.0	7.0
12	4.0	7.0
13	6.0	7.0
14	8.0	7.0
15	10.	7.0
16	2.0	10.

17	4.0	10.
18	6.0	10.
19	8.0	10.
20	10.	10.

If CFD results are used to replace the ZONAIR results, then in addition to the AEROGEN cards, the INPCFD bulk data cards are also needed in the ZONAIR input file and they should have the same card numbers as the AEROGEN cards.

It is noted that the ranges of Mach number and angle of attack should cover the minimum and maximum values of the Mach number and angle of attack specified in the trajectory data in the TPSOPT input file.

After running ZONAIR, an aerodynamic database is generated, which consists of three types of files: the Control table file, the Geometry file, and the flow field files. The Control table file, containing the combination table of the Mach number and angle of attack, is output in ASCII format, the geometry file, containing the grid coordinates and panel connectivity, is written in the binary format, and the flow field files (one file for one AEROGEN card), containing the velocities and C_p , are generated in OUTPUT4 format.

In order to use the database, the name of the Control table file, say CTRTABLE.DAT, should be assigned in the TPSOPT input file by the following statement

ASSIGN AEROBASE='CTRTABLE.DAT'

And other two database files will be activated automatically by this Control table file.

Step 2: Run TPSOPT to Perform Size Optimization

After the aerodynamic database is established by running ZONAIR, users can setup bulk data cards for the TPSOPT input file based on the geometry provided by the ZONAIR output geometry file. The central tasks of setting up the TPSOPT input file are the definition of patches over the TPS and generation of the trajectory time history data for thermal analysis. The definition of patches includes defining design variable panels, hot panels and thickness panels as well as the thermal structure types. Usually, the smaller the number of patches defined over the TPS, the smoother the optimal TPS surface is, of course, the lower the level of the optimization is achieved. The trajectory time history data consist of values of Mach number, altitude and angle of attack at different time moments. The number of time moments selected heavily influences the computational time and accuracy. The fewer time moments, the shorter the computational time is consumed and the poorer the accuracy of the computational result is.

If temperature mapping from optimal TPS to the structure surface (FEM surface elements) is required, FEM input file (only NASTRAN input file is available so far) needs to be specified using FEM bulk data card.

1.5 About the Application Manual

The objectives of the application manual is to provide guidelines and sample cases to demonstrate the key features and uses of the TPSOPT software system. This manual presents four sample cases for the generation of the optimal thickness and temperature mapping files.

2.0 Simplified X-34 Wing-Body Configuration

- *Purpose*: To demonstrate the applicability of the TPSOPT software system for the X-34

configuration over a wide range of flight conditions.

- *Input File*: - Standard input File: X34TPS.INP (Listing 2.1)

- Aerodynamic Database: CTRTABLE.DAT (Listing 2.2)

Geometry File: X34GEO.DAT (Binary file)ZONAIR Solution File: FLOWi (Listing 2.3)

- Output File: - Standard Output File: X34TPS.OUT (Listing 2.4)

- Vehicle Surface Mesh: X34SURF.NAS (Figure 2.1)

- Response surfaces for POD analysis (Figure 2.4)

- C_p and Temperature Plot File: CPTEMP.PLT (Figure 2.5)

- Optimal Thickness Distribution Plot File: X34THICK.PLT (Figure 2.6)

2.1 Surface Panels of X-34 Wing-Body Configuration

The simplified X-34 wing-body configuration consists of a body with a round nose of 7.0" radius, a strake, and a swept wing which are shown in Figure 2.1. The surface mesh is generated by ZONAIR and outputted as a binary file "X34GEO.DAT". Due to symmetry, only half of the configuration is considered in the ZONAIR model which consists of 1554 panels and 1559 grid points. These panels and grid points are stored in the file "X34GEO.DAT" which is used in TPSOPT by specifying the name on the second row of the aerodynamic database (CTRTABLE.DAT) that is imported by the "ASSIGN AEROBASE=" executive control command.

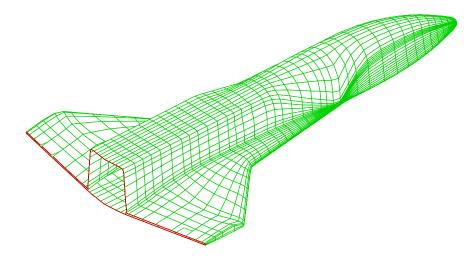


Figure 2.1. X-34 surface mesh

2.2 The Aerodynamic Database: CTRTABLE.DAT

The aerodynamic database is generated by running ZONAIR for 68 combinations of 4 Mach numbers (2, 5, 8, 10) and 17 angles of attack (0, 6, 10, 13, 15, 17, 19, 21, 22-30). This database provides the TPSOPT system with all flow field information from ZONAIR. The first row is a title card (X34); the second row provides the geometry file name (X34GEO.DAT); the third and fourth rows list the name of the reference chord, span, ...etc, and their values, respectively; the fifth row lists the names of items in the following rows (Mach number, Altitude, Angle of attack, etc.), and the remaining rows contain the values of the items listed in the fifth row and, in the last column, the file names (FLOW0001-FLOW0068) which store the velocities and pressure coefficients for the combinations of the Mach number and Angle of attack listed in the corresponding row.

It is noted that the order of the Mach numbers and angles of attack in the table must be ascending.

2.3 The Standard Input File (X34TPS.INP)

The standard input file consists of two major parts: the flow field quantities and TPS optimization system. The flow field quantities are provided by ZONAIR and imported by the aerodynamic database file (CTRTABLE.DAT) using the following statement on the first row:

ASSIGN AEROBASE='CTRTABLE.DAT'

The TPS optimization system is the major portion of the standard input file, which includes specification of trajectory data and definition of patches for the TPS. Fourteen patches are defined for the X-34 configuration (Figure 2.2), among which the patches 2, 5, 10, 12 and 14 which are defined on the lower surface of the vehicle and patch 9 is located over the leading edge of the horizontal wing. Figure 2.3 shows individual patches and panel numbers over them.

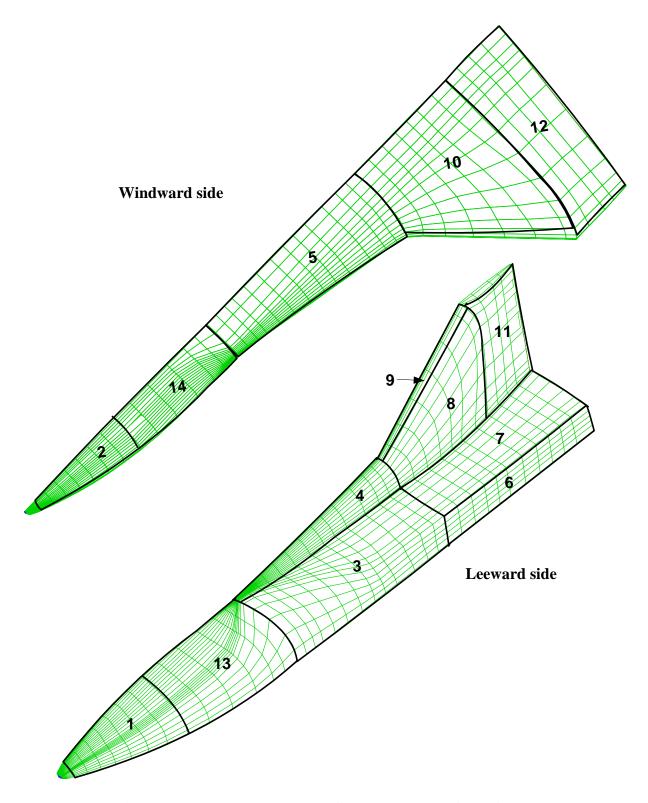
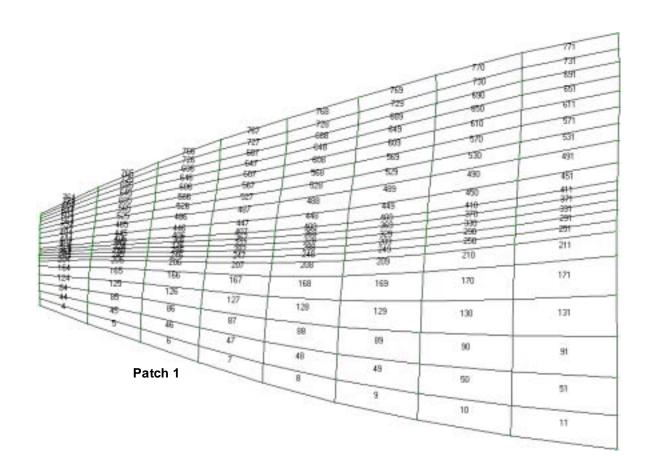


Figure 2.2. Fourteen patches defined over the surface of X-34



TARE	1487	1448	1449	1450	1451
	1407	1406	1409	1400	1411
	1367	1958		1410	1411
1326	1327		1389	1370	1371
1296		1328	1329		
1246	1287	1200		1330	1331
1306	1247		1289		
1186	1207	1248		1290	1291
1126	1187	1208	1249		
	1127	1167	1209	1250	1251
	1067	1120	1169	1210	1211
356	1587			4470	1211
136	1007-		1129	11/0	1171
1111	677	1048	1089	1130	
1	501	1008	1045	1000	1131
	362		7	1090	1091
	1	- 370-	1009	1050	
	-	7006	961	100	1051
			478-	1010	1011
			789	570	
			-	930	971
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177			# 1	- 19	-463	464	465			Patch	
J	178	700	364	362	383	424	425	428	407	468	469
137	17	190	221	302	347	384	385	306	367	388	389
1	138	9	181	200	303	344	345	346	347	348	349
97		140	141	182	223	257	305	306	307	308	309
1 1	98	9			183	220	265	286	267	260	269
		100	-	142	100	h	225	226	227	228	228
	-	-	101	-	143	184	185	186	187	188	189
57	58 5	9 60	+	102	103	144	145	146	147	148	149
		-	61	62		104	105	105	107	108	109
17	18 1	9 20			63	64	- 65	185	67	68	69
1 " 1		9 20	21	22	23	24	25	26	27	28	29

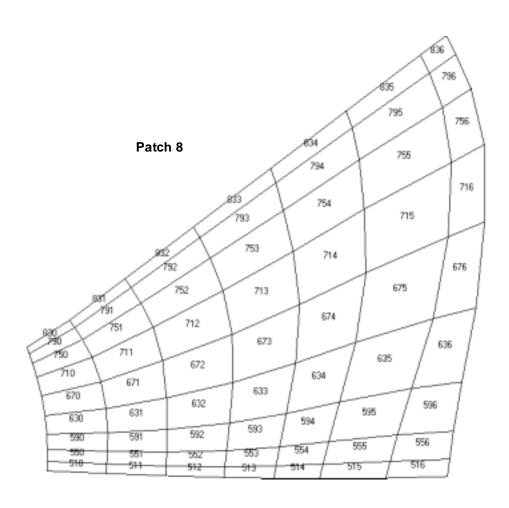


1457	1458	1459	1460	1461	1462	1463	1464	1465	1496	1467	1468	1489
1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1429	1429
1377	1370	1379	1380	1381	1362	1363	1384	1305	1386	1387	1388	1389
		1339	1340	1341	190	1343	1344	1345	1346	1347	1348	1349
		138		1901	1982	1303	1304	1335	1306	1307	1300	1309
- 10	1	144	111	700	1000	1293	1294	1265	1268	1287	1290	1268
	- 310	- 10	100		118	1169	1104	1225	1236	1227	1220	1229
			-			123	1166	1145-	1196	1197	1100	L
	Pate	ch 5			The same of		100	1105	1705	1141		1189
						-	- 94	- 100	1095	T187	TIDE	1149
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190	191	192	193	194	195	196	197	198	199	200
150	151	152	153	154	155	156	157	158	159	160
110	111	112	113	114	115	116	117	118	119	120
70	71	72	73	74	75	76	77	78	79	80
30	31	32	33	34	35	36	37	38	39	40

Patch 6

			Patch	7			477	478	479	490
430	471 431	472 432	473 433	474	475	436	437	438	399	400
390	391	392	393	394	395	396	397		359	360
350	351	352	353	354	395	356	357	350	353	
310	311	312	313	314	315	316	317	318	319	320
230	231	272	273	274	276 235	276	277	278	279	290



000	991	902		- 204	935	900
330	301	950	200			-
- 950	331	352	503	954	955	356
010	011	- 012	012	014	01.5	1 040
510	211	JIL.	313	314	313	316
- 670	977	872 1	873	-974	975	075
		33.75	91.9		913	010

Patch 9

	1470	1471	1472	1473	1474	1475	1476
	1430	1431	1432	1433	1434	1435	1436
	1390	1391	1392	1393	1394	1396	1396
	1350	1351	1352	1353	1354	1355	1356
	1310	1311	1312	1313	1314	1315	1316
	1230	1271	1272	1273	1274	1275	-
L	1190	1191	1232	1233		+	1276
		1151	1192	1193	1234	1235	1236
	1081	X	112	1153	1194	1	+
		1032	\ /	1113	1154	1195	1196
			1000		1114	1155	1
		Patch	10	X	1074	1115	1156
				`	D	1075	1116
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877	83	8	879 839	96 84		
797	1	798	799	8	00	
	757	758	759		760	
Patch 11	717	718	719		720	
	677	678	679		690	
	637	638	639		640	
	597	598	596	,	600	1
	557	558	55	9	560	1
	517	518	51	9	520	7

ſ	1477	1478	1475	9	1490
İ	1437	1438	1435	9 1	440
ţ	1397	1398	1390	9 1	400
	1357	1358	1358	9 1	360
	1317	1318	1319	1:	320
	1277	1278	1279	12	90
	1237	1238	1239	124	10
Patch 1	2 1197	1198	1199	1200	
	1157	1158	1159	1160	1
/	1117	1118	1119	1120	7
/1	077 / 1	079	1079	1080	1
997		38	1039 290	1000	1

Patch 13	730	774		
		-734		
772	733		615	
	693		575	
692	65 3	614	615 575 576 596 495	////216 /
65 2	613	574	458	// /
612	5/3	534		Y /170
	·	494		176
5/2	533	454		
532	493	414	215	1 / L
492	453	414 334 334 294	1//	
432		284	175	136
452	413	254	/ ''' /	136
412	333	214	1 /	
372	293			/
332	253		/	
			//	/
252	213	174	135	/
212			/	Y I
·				96
	173			
172		134		
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[1372	1373	1414		
	1332	1333	1374	1415	
İ	1292	1293	1334		
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Í	1212	1213	1250	1335	
İ	1172	1173	1212	/ / /	
t	1132	1133	1174	1295	1376
ŀ	1092	1093	1134	1215	
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ŀ	1012	1013	1054	1135	1296
	972	973	1018	1095	12%
-	932	933	974	1016	1326//
-	892	893	834	975 936 936	1796
_				995	

Figure 2.3. Fourteen separated patches defined over X-34

2.4 Thermal Structures for Patches

Two sets of thermal structures are used for the X-34 TPS. The last layer of either set is a structure layer, that is, no design panels are defined over it.

The first set of structures consists of 4 layers denoted using the bulk data card STTYPE numbers of 21, 23, 24, 25, respectively. The structures for the 4 layers are Slab, Honeycomb, Corrugated standoff, Slab, respectively, and material numbers for the optimization thickness parts of the five layers are 221 (HRSI COATING), 103 (ALUMINUM 7075-T6), 114 (INCONEL 617), and 101 (ALUMINUM 2024-T4). This set of thermal structures is defined for nose-near patches 1 and 2, and leading edge patch 9.

The second set of structures consists of 6 layers denoted using the bulk data card STTYPE numbers of 31, 32, 33, 34, 35, 36, respectively. The structures for the 6 layers are Thin skin, Slab, Thin skin, Slab, Thin skin, Slab, respectively. The materials for these layers are 221 (HRSI COATING), 266 (AB312 Fabric), 260 (Q-Felt(3.5 PCF)), 266 (AB312 Fabric), 245 (RTV-560), and 101 (ALUMINUM 2024-T4). This set of thermal structures is defined for patches 3-8 and 10-14.

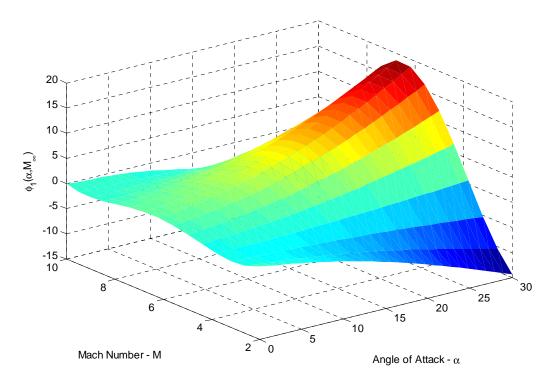
2.5 Output Information

The output information consists of the following items:

- (1) Response surfaces of C_p and velocities for POD analysis (Plot files)
- (2) C_p and temperatures for specified time steps in trajectory bulk data cards (Plot files)
- (3) Schematic text plotting of trajectory-related thermal quantities versus time over every patch. These quantities include enthalpy-based heat transfer coefficient, adiabatic wall enthalpy, and pressure.
- (4) Thickness of every design layer and the ratio of objective function values between optimal and initial thickness
- (5) Schematic text plotting of optimal thickness and maximum temperature over each layer for every patch
- (6) Optimal thickness and temperature over each layer for every panel (Plot file)

2.6 Results

The output items listed in Section 2.5 have been stored in a text file and some plotting files. The text file is the Standard Output File (X34TPS.OUT) which includes all the input information appearing in the Standard Input File (X34TPS.INP) and items (3)-(5) listed in the above section. Figures 2.4-2.6 show the response surfaces of C_p , and C_p and temperatures specified in the trajectory bulk data card, as well as the optimal thickness, respectively.



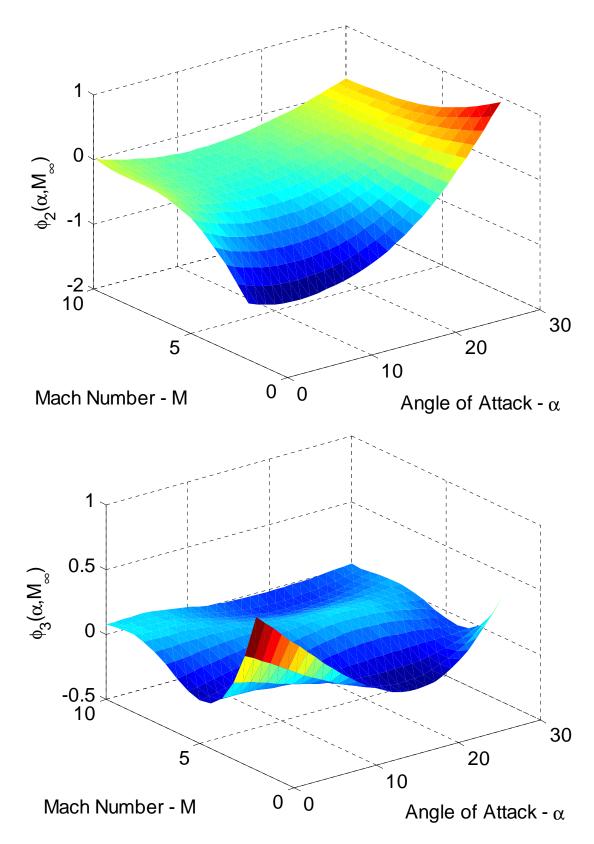


Figure 2.4. Response Surface of first three modes for POD analysis

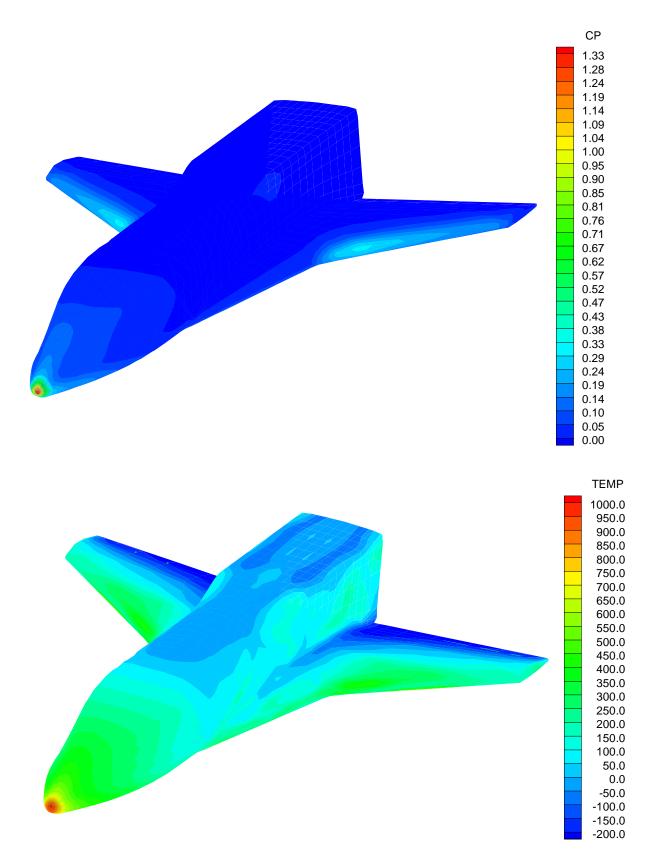
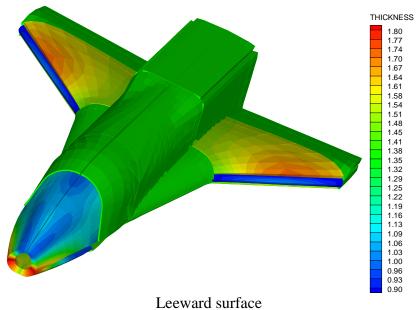
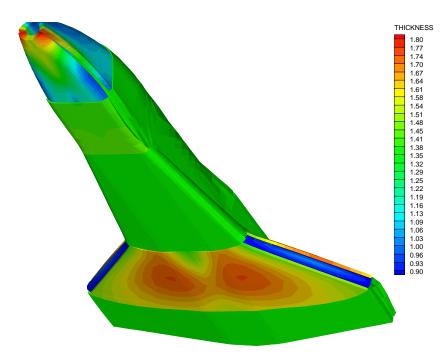
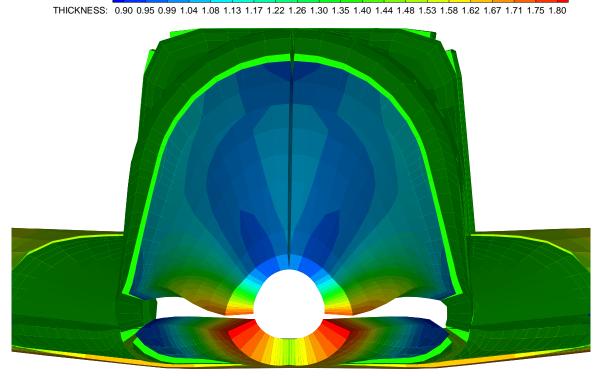


Figure 2.5. Plots of C_p and temperature at time=225 with M=8.8, AoA=10.225

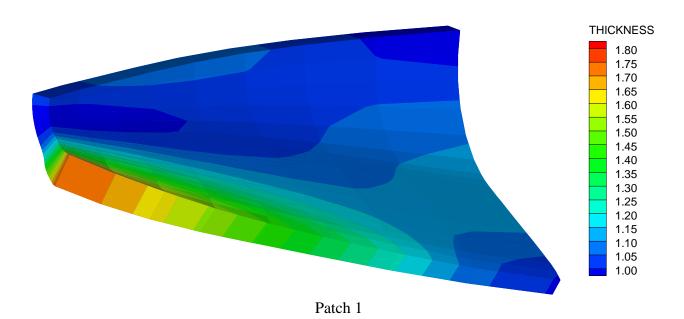




Windward surface



Front view



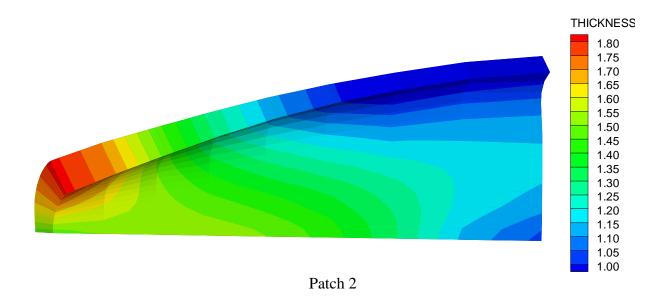


Figure 2.6 Plot of the optimal thickness of the TPS

2.7 Lists of Input and Output Files

• Input Data Listing:

Listing 2.1 Standard input File: X34TPS.INP

```
ASSIGN AEROBASE='CTRTABLE.DAT', PRINT=0
SOL 1
$ Begin Executive Control Section
CEND
ECHO = SORT
SUBCASE = 1
       SUBTITLE=TPS OPTIMISATION FOR X34
       LABEL= HYPERSONIC AERODYNAMIC DATABASE BY ZONAIR
       TPSDES=1
BEGIN BULK
$ PLOTTING AERODYNAMIC MODEL
                                       NASTRAN X34SURF.NAS
PLTAERO 1
            YES
                    NO
$ POLTTING TPS THICKNESS
PLTTPS 1
                               TECPLOT THICKML.PLT
                                                       -4.0
            1 ALL
                               TECPLOT THICK1L.PLT
PLTTPS -2
               1
                       ALL
                                                       -4.0
$TPSDES SETID
               PODRSM
                       TRJLST
                               IFPREH IDFEM/TPSSYM
TPSDES 1
                       1
                                       101
                                                                       CONT
               2
                               4
                                                              8
                                                                      CONT
CONT
       1
                       3
                                       5
                                               6
CONT
       9
               10
                       11
                               12
                                       13
                                               14
                               |FMUNIT |FLUNIT |FORM
       |IDFEM |IDCORD |FLIP
                                                       |NMINP1 |NMINP2 |CONT
SFEM
FEM
       101
                                        IN
                                               TECPLOT X34_DYN.DAT
                                                                       CONT
CONT
        X34_DYN.OUT
$PODRSM | TPSDES | METHOD | NRDMOD | TOLER | NEURON | SAVE
                                                       FILENM
```

PODRSM CONT	1 CPPODRSM	1 .P3D	UPODRSM	.P3D	SAVE VPODRSM.P3D	X34M1.RST WPODRSM.P3D	CONT
\$ \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	CERT	TDDATGII	MI VALID				
\$TPSSYM TPSSYM	SEIID 1	IDPATCH 1	NLAYER	4			CONT
CONT	1	21	0.08	2.			CONT
CONT	1	23	0.3	1.5			CONT
CONT	1	24	0.4	1.3			CONT
CONT	0	25	0.1	1.2			
TPSSYM	2	2	4	4			CONT
CONT	2	21	0.08	2.			CONT
CONT	2	23 24	0.3	1.5 1.3			CONT
CONT	0	25	0.1	1.2			CONT
TPSSYM	3	3	6	4			CONT
CONT	3	31	0.05	1.			CONT
CONT	3	32	0.08	0.6			CONT
CONT	3	33	1.00	3.			CONT
CONT	3	34	0.05	0.5			CONT
CONT	3	35	0.05	0.5			CONT
CONT TPSSYM	0 4	36 4	0.1 6	0.2 4			CONT
CONT	4	31	0.05	1.			CONT
CONT	4	32	0.08	0.6			CONT
CONT	4	33	1.00	3.			CONT
CONT	4	34	0.05	0.5			CONT
CONT	4	35	0.05	0.5			CONT
CONT	0	36	0.1	0.2			G01755
TPSSYM	5	5 21	6	4			CONT
CONT	5 5	31 32	0.05	1. 0.6			CONT CONT
CONT	5	33	1.00	3.			CONT
CONT	5	34	0.05	0.5			CONT
CONT	5	35	0.05	0.5			CONT
CONT	0	36	0.1	0.2			
TPSSYM	6	6	6	4			CONT
CONT	6	31	0.05	1.			CONT
CONT	6 6	32 33	0.08	0.6 3.			CONT
CONT	6	34	0.05	0.5			CONT
CONT	6	35	0.05	0.5			CONT
CONT	0	36	0.1	0.2			
TPSSYM	7	7	6	4			CONT
CONT	7	31	0.05	1.			CONT
CONT	7	32	0.08	0.6			CONT
CONT	7	33	1.00	3.			CONT
CONT	7 7	34 35	0.05 0.05	0.5 0.5			CONT
CONT	0	36	0.1	0.2			COIVI
TPSSYM	8	8	6	4			CONT
CONT	8	31	0.05	1.			CONT
CONT	8	32	0.08	0.6			CONT
CONT	8	33	1.00	3.			CONT
CONT	8	34	0.05	0.5			CONT
CONT	8	35 36	0.05 0.1	0.5 0.2			CONT
TPSSYM	9	9	4	4			CONT
CONT	9	21	0.08	2.			CONT
CONT	9	23	0.3	1.5			CONT
CONT	9	24	0.4	1.3			CONT
CONT	0	25	0.1	1.2			
TPSSYM	10	10	6	4			CONT
CONT	10	31	0.05	1.			CONT
CONT	10 10	32 33	0.08	0.6 3.			CONT
CONT	10	34	0.05	0.5			CONT
CONT	10	35	0.05	0.5			CONT
CONT	0	36	0.1	0.2			
TPSSYM	11	11	6	4			CONT
CONT	11	31	0.05	1.			CONT
CONT	11	32	0.08	0.6			CONT

CONT	11	33	1.00	3.			CONT
CONT	11	34	0.05	0.5			CONT
CONT	11	35	0.05	0.5			CONT
CONT	0	36	0.1	0.2			
TPSSYM	12	12	6	4			CONT
CONT	12	31	0.05	1.			CONT
CONT	12	32	0.08	0.6			CONT
CONT	12	33	1.00	3.			CONT
CONT	12	34	0.05	0.5			CONT
CONT	12	35	0.05	0.5			CONT
CONT	0	36	0.1	0.2			
TPSSYM	13	13	6	4			CONT
CONT	13	31	0.05	1.			CONT
CONT	13	32	0.08	0.6			CONT
CONT	13	33	1.00	3.			CONT
CONT	13	34	0.05	0.5			CONT
CONT	13	35	0.05	0.5			CONT
CONT	0	36	0.1	0.2			
TPSSYM	14	14	6	4			CONT
CONT	14	31	0.05	1.			CONT
CONT	14	32	0.08	0.6			CONT
CONT	14	33	1.00	3.			CONT
CONT	14	34	0.05	0.5			CONT
CONT	14	35	0.05	0.5			CONT
CONT	0	36	0.03	0.3			CONT
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STTYPE	21	1	221				CONT
CONT	0.1	1	206				CONTE
STTYPE	22	1	206				CONT
CONT	0.5	2	100	100	100		G01777
STTYPE	23	3	103	103	103		CONT
CONT	0.12	0.11	0.095	0.75	0.3		
STTYPE	24	4	114	114	127		CONT
CONT	0.08	0.08	0.12	1.0	0.8		
STTYPE	25	1	101				CONT
CONT	0.1						
				T OF THE	VEHICLE	;	
\$ AFRS	SI BLANKI 31	ET FOR O	THER PAR	T OF THE	VEHICLE]	CONT
				T OF THE	VEHICLE]	CONT
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STTYPE CONT STTYPE	31 0.08 32	6	221	T OF THE	VEHICLE	2	
STTYPE CONT STTYPE CONT	31 0.08 32 0.18	6	221 266	T OF THE	VEHICLE		CONT
STTYPE CONT STTYPE CONT STTYPE	31 0.08 32 0.18 33	6	221 266	T OF THE	VEHICLE	2	CONT
STTYPE CONT STTYPE CONT STTYPE CONT	31 0.08 32 0.18 33 2.0	6 1 6	221266260	T OF THE	VEHICLE	1	CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE	31 0.08 32 0.18 33 2.0 34	6 1 6	221266260	T OF THE	VEHICLE	1	CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT	31 0.08 32 0.18 33 2.0 34 0.11	6 1 6	221266260266	T OF THE	VEHICLE		CONT CONT
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STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT	31 0.08 32 0.18 33 2.0 34 0.11 35	6 1 6 1	221266260266245	T OF THE	VEHICLE	1	CONT CONT CONT
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STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36	6 1 6 1	221 266 260 266 245 101	T OF THE		1.1	CONT CONT CONT
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STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$TTYPE CONT \$PATCH \$PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4	6 1 6 1 6 1 RHSPAN 11	221 266 260 266 245 101 9000000 RHSHOT 12	0 50.0	15.	1.1 TIMESP 1	CONT CONT CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$TTYPE CONT \$PRVAL \$ \$PATCH PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4	6 1 6 1 6 1 7 8 1 RHSPAN 11 21	221 266 260 266 245 101 9000000 RHSHOT 12 22	0 50.0	15.	1.1 TIMESP 1 1	CONT CONT CONT
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STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$ PRVAL \$ \$PATCH PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 7 8 9	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1	CONT CONT CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$TTYPE CONT \$PRVAL \$ \$PATCH PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 6 7 8 9	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1	CONT CONT CONT
STTYPE CONT STTYPE STTYPE CONT	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 6 7 8 9 10 11	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101 111	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102 112	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1 1	CONT CONT CONT
STTYPE CONT STTYPE STTYPE CONT STTYPE S	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 7 8 9 10 11 12	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101 111 121	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102 112 122	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1 1 1 1	CONT CONT CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$ PRVAL \$ PRVAL \$ PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 7 8 9 10 11 12 13	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101 111 121 131	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102 112 122 132	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1 1 1 1 1	CONT CONT CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$ PRVAL \$ PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 7 8 9 10 11 12	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101 111 121	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102 112 122	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1 1 1 1	CONT CONT CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$ PRVAL \$ PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 7 8 9 10 11 12 13 14	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101 111 121 131 141	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102 112 122 132 142	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1 1 1 1 1	CONT CONT CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$ PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 6 7 8 9 10 11 12 13 14 ID	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101 111 121 131 141 NE	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102 112 122 132 142 ME	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1 1 1 1 1	CONT CONT CONT CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$ PATCH PATC	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 7 8 9 10 11 12 13 14 ID 11 12 13 14 15 16 17 18 18 18 18 18 18 18 18 18 18	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101 111 121 131 141 NE 3	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102 112 122 132 142 ME 3	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1 1 1 1 1	CONT CONT CONT CONT
STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT STTYPE CONT \$ PATCH	31 0.08 32 0.18 33 2.0 34 0.11 35 0.1 36 0.15 4 ID 1 2 3 4 5 6 6 7 8 9 10 11 12 13 14 ID	6 1 6 1 6 1 RHSPAN 11 21 31 41 51 61 71 81 91 101 111 121 131 141 NE	221 266 260 266 245 101 9000000 RHSHOT 12 22 32 42 52 62 72 82 92 102 112 122 132 142 ME	0 50.0	15.	1.1 TIMESP 1 1 1 1 1 1 1 1 1 1 1 1 1	CONT CONT CONT CONT

CONT	364	328	371						CONT
CONT	764 2	768 3	771 3						CONT
DESVAR CONT	884	3 888	891						CONT
CONT	1164	1208	1211						CONT
CONT	1444	1448	1451						
DESVAR	3	3	3						CONT
CONT	17	24	29						CONT
CONT	97	264	229						CONT
CONT	457	464	469						
DESVAR	4	3	3						CONT
CONT	497	504	509						CONT
CONT	697 897	664 904	669 909						CONT
DESVAR	5	3	3						CONT
CONT	937	944	949						CONT
CONT	1377	1304	1269						CONT
CONT	1457	1464	1469						
DESVAR	6	2	2						CONT
CONT	30	40							CONT
CONT	190	200							
DESVAR	7	3	2						CONT
CONT	230 470	235 475	240 480						CONT
DESVAR	8	3	3						CONT
CONT	510	513	516						CONT
CONT	670	673	676						CONT
CONT	830	833	836						
DESVAR	9	3	4						CONT
CONT	870	873	876						CONT
CONT	910	913	916						CONT
CONT	950	953	956						CONT
CONT	990	993	996						G0175
DESVAR	10	3 1472	3 1470						CONT
CONT	1476 1236	1473 1233	1470 1270						CONT CONT
CONT	1036	1033	1030						CONT
DESVAR	11	3	2						CONT
CONT	877	677	517						CONT
CONT	880	680	520						
DESVAR	12	3	2						CONT
CONT	1000	1240	1480						CONT
CONT	997	1237	1477						
DESVAR	13	3	3						CONT
CONT	12 372	14 214	16 136						CONT
CONT	772	774	776						CONT
DESVAR	14	3	3						CONT
CONT	892	894							CONT
CONT	1212	1214							CONT
CONT	1452	1454	1456						
\$									
TIMESP	1	100.	200.			500.	600.	700.	CONT
CONT	800.	900.			•				
\$ PANLST2	11	Ρ.	ANEL LIS	1. PAR.I. 4	5	6	7	8	9+CON
+CON		.0	11	44	45	46	47	48	49+CON
+CON		50	51	84	85	86	87	88	89+CON
+CON		0	91	124	125	126	127	128	129+CON
+CON	13	30	131	164	165	166	167	168	169+CON
+CON	17		171	204	205	206	207	208	209+CON
+CON	21		211	244	245	246	247	248	249+CON
+CON	25		251	284	285	286	287	288	289+CON
+CON	29		291	324	325	326	327	328	329+CON
+CON +CON	33 37		331 371	364 404	365 405	366 406	367 407	368 408	369+CON 409+CON
+CON +CON	41		411	444	445	446	447	448	409+CON 449+CON
+CON	45		451	484	485	486	487	488	489+CON
+CON	49		491	524	525	526	527	528	529+CON
+CON	53		531	564	565	566	567	568	569+CON
+CON	57	70	571	604	605	606	607	608	609+CON

+CON +CON		610 650	611 651	644 684	645 685	646 686		47 87	64 68		649+CON 689+CON	
+CON +CON		690	691	724	725	726		27	72		729+CON	
+CON		730	731	764	765	766		67	76		769+CON	
+CON		770	771									
PANLST2		= 60	4	8	11		364		328	371	CONT	
CONT	764	768	771		005	006	0	07	0.0	0.0	0.00 - 0.00	
PANLST2 +CON		21 890	891	884 924	885 925	886 926		87 27	88 92		889+CON 929+CON	
+CON		930	931	964	965	966		67	96		969+CON	
+CON		970	971	1004	1005	1006	10		100		1009+CON	
+CON		1010	1011	1044	1045	1046	10	47	104	18	1049+CON	
+CON		1050	1051	1084	1085	1086	10		108		1089+CON	
+CON +CON		1090	1091	1124	1125	1126	11		112		1129+CON	
+CON +CON		1130 1170	1131 1171	1164 1204	1165 1205	1166 1206	11 12		116 120		1169+CON 1209+CON	
+CON		1210	1211	1244	1245	1246	12		124		1249+CON	
+CON		1250	1251	1284	1285	1286	12		128		1289+CON	
+CON		1290	1291	1324	1325	1326	13	27	132	28	1329+CON	
+CON		1330	1331	1364	1365	1366	13		136		1369+CON	
+CON		1370	1371	1404	1405	1406	14		140		1409+CON	
+CON +CON		1410 1450	1411 1451	1444	1445	1446	14	4 /	144	10	1449+CON	
PANLST2	22	1130	884	888	891		1164		1208	1211	L CONT	
CONT	144	4 144										
PANLST2		31		17	18	19		20		21	22+CON	
+CON		23	24	25	26	27		28		29	57+CON	
+CON		58	59	60	61	62		63		54	65+CON	
+CON +CON		66 101	67 102	68 103	69 104	97 105		98 06	10	9 17	100+CON 108+CON	
+CON		109	137	138	139	140		41	14		143+CON	
+CON		144	145	146	147	148		49	17		178+CON	
+CON		179	180	181	182	183		84	18		186+CON	
+CON		187	188	189	217	218		19	22		221+CON	
+CON		222 257	223 258	224	225 260	226 261		27	22 26		229+CON	
+CON +CON		265	266	259 267	268	269		62 97	29		264+CON 299+CON	
+CON		300	301	302	303	304		05	30		307+CON	
+CON		308	309	337	338	339		40	34		342+CON	
+CON		343	344	345	346	347		48	34		377+CON	
+CON		378	379	380	381	382		83	38		385+CON	
+CON +CON		386 421	387 422	388 423	389 424	417 425		18 26	41 42		420+CON 428+CON	
+CON +CON		421	457	458	459	460		20 61	46		428+CON 463+CON	
+CON		464	465	466	467	468		69	10	, _	103.001	
PANLST2	32			17	24	29		97	26	54	229+CON	CONT
+CON		457	464	469								
PANLST2		41	E0.4	497	498	499		00	50		502+CON	
+CON +CON		503 538	504 539	505 540	506 541	507 542		08 43	5 (5 4		537+CON 545+CON	
+CON		546	547	548	549	577		78	57		580+CON	
+CON		581	582	583	584	585		86	58		588+CON	
+CON		589	617	618	619	620		21	62		623+CON	
+CON		624	625	626	627	628		29	65		658+CON	
+CON		659	660	661	662	663		64	66		666+CON	
+CON +CON		667 702	668 703	669 704	697 705	698 706		99 07	70 70		701+CON 709+CON	
+CON		737	738	739	740	741		42	74		744+CON	
+CON		745	746	747	748	749		77	77		779+CON	
+CON		780	781	782	783	784		85	78		787+CON	
+CON		788	789	817	818	819		20	82		822+CON	
+CON		823	824	825	826	827		28	82		857+CON	
+CON +CON		858 866	859 867	860 868	861 869	862 897		63 98	86 89		865+CON 900+CON	
+CON +CON		901	902	903	904	905		96 06	90		908+CON	
+CON		909	-		-			-	- `			
PANLST2			497		897		501		701	901	CONT	
CONT	504	664			707		907		509	589	CONT	
CONT PANLST2	669	789 51	909	937	938	939	0	40	94	L1	942+CON	
+CON		943	944	945	936	947		48	94		942+CON 977+CON	
-		-		-			_	-				

+CON		978	979	980	981	982	983	984	985+CON	
+CON		986	987	988	989	1017	1018	1019	1020+CON	
+CON		1021	1022	1023	1024	1025	1026	1027	1028+CON	
+CON		1029	1057	1058	1059	1060	1061	1062	1063+CON	
+CON		1064	1065	1066	1067	1068	1069	1097	1098+CON	
+CON		1099	1100	1101	1102	1103	1104	1105	1106+CON	
+CON		1107	1108	1109	1137	1138	1139	1140	1141+CON	
+CON		1142	1143	1144	1145	1146	1147	1148	1149+CON	
+CON		1177	1178	1179	1180	1181	1182	1183	1184+CON	
+CON		1185	1186	1187	1188	1189	1217	1218	1219+CON	
+CON		1220	1221	1222	1223	1224	1225	1226	1227+CON	
+CON		1228	1229	1257	1258	1259	1260	1261	1262+CON	
+CON		1263	1264	1265	1266	1267	1268	1269	1297+CON	
+CON		1298	1299	1300	1301	1302	1303	1304	1305+CON	
+CON		1306	1307	1308	1309	1337	1338	1339	1340+CON	
+CON		1341	1342	1343	1344	1345	1346	1347	1348+CON	
+CON		1349	1377	1378	1379	1380	1381	1382	1383+CON	
+CON		1384	1385	1386	1387	1388	1389	1417	1418+CON	
+CON		1419	1420	1421	1422	1423	1424	1425	1426+CON	
+CON		1427	1428	1429	1457	1458	1459	1460	1461+CON	
+CON		1462	1463	1464	1465	1466	1467	1468	1469	
	F 2	1402		1404						
PANLST2	54	1 4 5 7	937	1460	944	949	1377	1304	1269+CON	
+CON		1457	1464	1469	0.4				0= ====	
PANLST2		61		30	31	32	33	34	35+CON	
+CON		36	37	38	39	40	70	71	72+CON	
+CON		73	74	75	76	77	78	79	80+CON	
+CON		110	111	112	113	114	115	116	117+CON	
+CON		118	119	120	150	151	152	153	154+CON	
+CON		155	156	157	158	159	160	190	191+CON	
+CON		192	193	194	195	196	197	198	199+CON	
+CON		200								
PANLST2		62		30		40	190	200		
PANLST2		71		230	231	232	233	234	235+CON	
+CON		236	237	238	239	240	270	271	272+CON	
+CON		273	274	275	276	277	278	279	280+CON	
+CON		310	311	312	313	314	315	316	317+CON	
+CON		318	319	320	350	351	352	353	354+CON	
+CON		355	356	357	358	359	360	390	391+CON	
+CON		392	393	394	395	396	397	398	399+CON	
+CON		400	430	431	432	433	434	435	436+CON	
+CON		437	438	439	440	470	471	472	473+CON	
+CON		474	475	476	477	478	479	480		
PANLST2		72		230	350	470	312	392	235	CONT
CONT		355	475	238	358	478	240	360	480	
PANLST2		81		510	511	512	513	514	515+CON	
+CON		516	550	551	552	553	554	555	556+CON	
+CON		590	591	592	593	594	595	596	630+CON	
+CON		631	632	633	634	635	636	670	671+CON	
+CON		672	673	674	675	676			712+CON	
+CON		713	714	715	716	750			753+CON	
+CON		754	755	756	790	791			794+CON	
+CON		795	796	830	831	832	833	834	835+CON	
+CON		836								
PANLST2	82		510	590	670		750	830 512	CONT	
CONT	632	752	832	513	673		833	514 634	CONT	
CONT	754	834	635	715	795		516	596 676	CONT	
CONT	756									
PANLST2	, 5 0	91		870	871	872	873	874	875+CON	
+CON		876	910	911	912	913			916+CON	
+CON +CON		950		952	953	954		956	990+CON	
			951					950	990+CON	
+CON	0.0	991	992	993	994	995		0.01		
PANLST2			870	910			990	871 951		
		992	873	913	953		993	874 954	CONT	
CONT	912		876	916						
CONT CONT	912		0/0			1022	1033	1034	1025.001	
CONT		995 101	070	1030	1031	1032	2000	1034	1035+CON	
CONT CONT			1070	1030 1071	1031 1072	1032		1075	1035+CON 1076+CON	
CONT CONT PANLST2		101					1074			
CONT CONT PANLST2 +CON +CON		101 1036 1110	1070	1071 1112	1072	1073	1074 1115	1075 1116	1076+CON 1150+CON	
CONT CONT PANLST2 +CON +CON +CON		101 1036 1110 1151	1070 1111 1152	1071 1112 1153	1072 1113 1154	1073 1114 1155	1074 1115 1156	1075 1116 1190	1076+CON 1150+CON 1191+CON	
CONT CONT PANLST2 +CON +CON +CON +CON		101 1036 1110 1151 1192	1070 1111 1152 1193	1071 1112 1153 1194	1072 1113 1154 1195	1073 1114 1155 1196	1074 1115 1156 1230	1075 1116 1190 1231	1076+CON 1150+CON 1191+CON 1232+CON	
CONT CONT PANLST2 +CON +CON +CON		101 1036 1110 1151	1070 1111 1152	1071 1112 1153	1072 1113 1154	1073 1114 1155	1074 1115 1156 1230	1075 1116 1190 1231	1076+CON 1150+CON 1191+CON	

+CON										
+COI/	133	.5	1316	1350		1351	1352	1353	1354	1355+CON
+CON	13!	6	1390	1391		1392	1393	1394	1395	1396+CON
+CON	14:		1431	1432		1433	1434	1435		1470+CON
+CON	14		1472	1473		1474	1475	1476		1170.001
			1470							1 2 7 0 + COM
PANLST2		1000				1473	1470	1236	1233	1270+CON
+CON	1036	1033	1030							
PANLST2	11:			517		518	519	520		558+CON
+CON	5!	59	560	597		598	599	600	637	638+CON
+CON	6:	39	640	677		678	679	680	717	718+CON
+CON	7:	9	720	757		758	759	760	797	798+CON
+CON	79		800	837		838	839	840		878+CON
+CON	8'		880	037		030	037	010	011	0701CON
		9		,	- 77	F17		020	750 500	COMM
PANLST2			877		577	517		838	758 598	CONT
CONT	719	639	880		760	680		600	520	
PANLST2	12:	-		997		998	999	1000	1037	1038+CON
+CON	10:	39	1040	1077		1078	1079	1080	1117	1118+CON
+CON	11:	.9	1120	1157		1158	1159	1160	1197	1198+CON
+CON	119	9	1200	1237		1238	1239	1240	1277	1278+CON
+CON	12		1280	1317		1318	1319	1320		1358+CON
+CON	13!		1360	1397		1398	1399	1400		1438+CON
										1430+CON
+CON	14:	39	1440	1477		1478	1479	1480		
PANLST2			100	-		1240	1480	997		1477
PANLST2	13:	-		12		13	14	15	16	52+CON
+CON	!	3	54	55		56	92	93	94	95+CON
+CON	9	96	132	133		134	135	136	172	173+CON
+CON	1'	4	175	176		212	213	214		216+CON
+CON	2!		253	254		255	256	292		294+CON
+CON		95	296	332		333	334	335		372+CON
+CON	3'		374	375		376	412	413		415+CON
+CON	4:	.6	452	453		454	455	456	492	493+CON
+CON	49	4	495	496		532	533	534	535	536+CON
+CON	5'	72	573	574		575	576	612	613	614+CON
+CON	6:		616	652		653	654	655		692+CON
+CON	69		694	695		696	732	733		735+CON
+CON	7:		772	773		774	775	776		7551CON
		0					115			g 0.17m
PANLST2			12		L4	16		132	134 372	CONT
CONT	214	136	533		772					
DANTE OFFO					, , 2	774		776		
PANLST2	141			892	, , 2	893	894	895	896	932+CON
+CON	141 9:	33	934		7 7 2		894 972			932+CON 975+CON
			934 1012	892		893 936		895	974	
+CON +CON	9: 9'	76	1012	892 935 1013	:	893 936 1014	972 1015	895 973 1016	974 1052	975+CON 1053+CON
+CON +CON +CON	9: 9' 10!	76 54	1012 1055	892 935 1013 1056		893 936 1014 1092	972 1015 1093	895 973 1016 1094	974 1052 1095	975+CON 1053+CON 1096+CON
+CON +CON +CON	9: 9' 10! 11:	76 54 32	1012 1055 1133	892 935 1013 1056 1134		893 936 1014 1092 1135	972 1015 1093 1136	895 973 1016 1094 1172	974 1052 1095 1173	975+CON 1053+CON 1096+CON 1174+CON
+CON +CON +CON +CON	9: 9' 10! 11:	76 54 82 75	1012 1055 1133 1176	892 935 1013 1056 1134 1212		893 936 1014 1092 1135 1213	972 1015 1093 1136 1214	895 973 1016 1094 1172 1215	974 1052 1095 1173 1216	975+CON 1053+CON 1096+CON 1174+CON 1252+CON
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+CON +CON +CON +CON +CON +CON +CON +CON	9: 9: 9: 10! 11: 11: 12: 12: 13: 14! 142 14! SETID 1 TRAJID TIME 1 .000000: .330000: .490000: .160000: .128000:	76 64 63 75 63 63 64 65 62 1. 60 60 60 60 60 60 60 60 60 60	1012 1055 1133 1176 1254 1332 1375 1453 1454 1454 14826 1482	892 935 1013 1056 1134 1212 1255 1333 1376 1454 892 1456 H F 600E6 690E6 688E6 196E6 141E6 358E7 897E7 668E7 489E7 307E7 479E7 479E7 476E7	AOA 4 14 9 3 3 3 10 10 10 10 30	893 936 1014 1092 1135 1213 1256 1334 1412 1455 894 BETA 0000 0000 4208 6000 6000 6000 6000 6000 6000 6000 2250 225	972 1015 1093 1136 1214 1292 1335 1413 1456 896	895 973 1016 1094 1172 1215 1293 1336 1414 1212	974 1052 1095 1173 1216 1294 1372 1415 1214 FILE1 FILE	975+CON 1053+CON 1096+CON 1174+CON 1295+CON 1295+CON 1373+CON 1416+CON 1376+CON 1376+CON CONT
+CON +CON +CON +CON +CON +CON +CON +CON	9: 9: 9: 10! 11: 11: 12: 12: 13: 14! 142 14! SETID 1 TRAJID TIME 1 .000000: .330000: .490000: .160000: .128000:	76 64 63 75 63 63 64 65 62 1. 60 60 60 60 60 60 60 60 60 60	1012 1055 1133 1176 1254 1332 1375 1453 1454 1454 1454 1454 14826.430 3429.58: 7754.82: 19306.11: 3065.14: 80536.18: 88387.22: 4718.26: 88577.29: 73075.31: 80061.31: 82765.30:	892 935 1013 1056 1134 1212 1255 1333 1376 1454 892 1456 H F 600E6 690E6 688E6 196E6 141E6 358E7 897E7 668E7 489E7 307E7 479E7 479E7 476E7	AOA 4 14 9 3 3 3 10 10 10 10 30	893 936 1014 1092 1135 1213 1256 1334 1412 1455 894 BETA 0000 0000 4208 6000 6000 6000 6000 6000 6000 6000 2250 225	972 1015 1093 1136 1214 1292 1335 1413 1456 896	895 973 1016 1094 1172 1215 1293 1336 1414 1212	974 1052 1095 1173 1216 1294 1372 1415 1214 FILE1 FILE	975+CON 1053+CON 1096+CON 1174+CON 1252+CON 1273+CON 1376+CON 1376+CON 1376+CON 1376+CON CONT

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CONT
         .30300E3 7.42020.20828E7 30.0000
                                                                                       CONT
CONT
         .32300E3 6.98630.17006E7 30.0000
                                                                                       CONT
CONT
         .34100E3 6.51451.15705E7 17.6576
                                                                                       CONT
CONT
         .35900E3 6.29482.15555E7 11.3822
                                                                                       CONT
CONT
                                                                                       CONT
         .37900E3 6.12626.15505E7 11.5945
CONT
         .39900E3 5.96248.15405E7 11.6852
                                                                                       CONT
         .41900E3 5.80340.15256E7 11.6316
CONT
                                                                                       CONT
         .43900E3 5.64886.15063E7 11.4712
                                                                                       CONT
CONT
CONT
         .45900E3 5.49856.14827E7 11.2120
                                                                                       CONT
CONT
         .47900E3 5.35216.14551E7 10.8676
                                                                                       CONT
CONT
         .49900E3 5.20938.14237E7 10.4565
                                                                                       CONT
         .51900E3 5.06993.13890E7 9.9883
.53900E3 4.92935.13511E7 9.3991
CONT
                                                                                       CONT
CONT
                                                                                       CONT
         .55900E3 4.78106.13103E7 8.7931
CONT
                                                                                       CONT
CONT
       .57900E3 4.62119.12670E7 8.2187
                                                                                       CONT
         .59900E3 4.44764.12216E7 7.6847
.61900E3 4.25902.11747E7 7.2020
CONT
                                                                                       CONT
CONT
                                                                                       CONT
         .63900E3 4.05448.11267E7 6.7771
CONT
                                                                                       CONT
CONT
         .65900E3 3.82413.10782E7 6.3472
                                                                                       CONT
         .67900E3 3.56631.10300E7 5.9874
                                                                                       CONT
CONT
         .69900E3 3.28723.98254E6 5.7202
CONT
                                                                                       CONT
         .71759E3 3.00000.93312E6 4.8191
CONT
                                                                                       CONT
         .73600E3 2.68846.87329E6 4.1829
.75600E3 2.29065.80146E6 3.4982
.77600E3 1.86649.72891E6 3.0646
CONT
                                                                                       CONT
CONT
                                                          TECPLOT CPTEMP3.PLT
                                                                                       CONT
CONT
                                                                                       CONT
CONT
         .79600E3 1.47000.66074E6 3.0928
                                                                                       CONT
         .81600E3 1.14676.59940E6 3.3054
.83600E3 0.96665.54315E6 3.8323
CONT
                                                                                       CONT
CONT
                                                                                       CONT
       .85600E3 0.86983.48792E6 3.8046
                                                                                       CONT
CONT
         .87400E3 0.80178.43914E6 3.9110
.89400E3 0.73186.38870E6 3.9359
                                                                                       CONT
CONT
CONT
                                                                                       CONT
         .91400E3 0.67432.34157E6 3.9549
                                                                                       CONT
CONT
CONT
         .93400E3 0.62713.29712E6 3.9492
                                                                                       CONT
         .95400E3 0.58784.25488E6 3.9046 .97400E3 0.55190.21464E6 3.8498
CONT
                                                                                       CONT
CONT
                                                                                       CONT
         .99400E3 0.51899.17633E6 3.8233
CONT
                                                                                       CONT
         .10140E4 0.48941.13984E6 3.8101
.10340E4 0.46307.10502E6 3.8009
.10540E4 0.43975.71741E5 3.7895
CONT
                                                                                       CONT
CONT
                                                                                       CONT
                                                                                       CONT
CONT
         .10740E4 0.41915.39891E5 3.7718
.10940E4 0.40098.93915E4 3.7458
CONT
                                                                                       CONT
CONT
$THERMPR|SETID |TRAJID |TEMP |HOTWALL|TRANS |GAS
                                                                                   1
                                                                    EMMS
                                                                           THERMPR 1
ENDDATA
```

2-22

Listing 2.2 Control Table File: CTRTABLE.DAT

					Lisung A	2.2 CUI	iuui Tai	ne rue.	CINIA	DLE.DA	1		
x34													
X34GEO.DAT													
REFC	REFB	REFS	REFX	REFY	REFZ	NO AESURFZ							
3.5304E+02	1.0000E+00	1.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	IN	SLIN					
MACH	H	ALPHA	BETA	PRATE	QRATE	RRATE	CD	CY	CL	CR	CM	CN	FILE
2.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.5971E+02	1.1602E-01	1.2856E+03	2.2528E+01	-1.9837E+03	1.1244E+02FLOW0	001
5.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.8918E+02	9.6770E-02	2.5032E+02	1.3082E+01	-3.4913E+02	1.6662E+01FLOW0	002
8.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.3088E+02	-6.7181E-02	4.9015E+01	2.9096E+00	-8.6678E+01	-7.0483E+01FLOW0	003
1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00			-5.2407E-03				-7.0093E+01FLOW0	
2.0000E+00	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00			-2.9855E-03				-2.3716E+02FLOW0	
5.0000E+00	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-6.1486E-02				-5.5305E+01FLOW0	
8.0000E+00	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-6.2833E-02				8.1746E+01FLOW0	
1.0000E+01	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.2351E-01				3.7729E+01FLOW0	
2.0000E+00	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00			-1.6332E-01				-6.1242E+00FLOW0	
5.0000E+00	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		9.1895E-02				-4.4375E+01FLOW0	
8.0000E+00						0.0000E+00		1.2834E-01					
		1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00							-7.8944E+01FLOW0	
1.0000E+01	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	5.7887E+02					2.9509E+01FLOW0	
2.0000E+00		1.3000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00						-1.8894E+02FLOW0	
5.0000E+00		1.3000E+01	0.0000E+00	0.0000E+00	0.0000E+00			8.7641E-02				4.3439E+00FLOW0	
8.0000E+00	0.0000E+00	1.3000E+01	0.0000E+00	0.0000E+00	0.0000E+00			5.9525E-02				-6.1061E+01FLOW0	
1.0000E+01		1.3000E+01		0.0000E+00	0.0000E+00			-7.1151E-03				-3.8253E+01FLOW0	
2.0000E+00				0.0000E+00	0.0000E+00							-2.0354E+02FLOW0	
5.0000E+00	0.0000E+00	1.5000E+01	0.0000E+00	0.0000E+00	0.0000E+00			1.4423E-01				-1.2500E+02FLOW0	
8.0000E+00				0.0000E+00	0.0000E+00			1.1365E-01				-6.5669E+01FLOW0	
1.0000E+01	0.0000E+00	1.5000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.3816E+03	3.9231E-02	3.2250E+03	-4.2597E+00	-4.1546E+03	-1.8969E+01FLOW0	020
2.0000E+00	0.0000E+00	1.7000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	3.7591E+03	8.5554E-02	9.7522E+03	-8.6507E+01	-1.3417E+04	-2.3777E+02FLOW0	021
5.0000E+00	0.0000E+00	1.7000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.1782E+03	-2.2946E-01	4.8740E+03	-2.8204E+01	-6.4238E+03	-5.5987E+01FLOW0	022
8.0000E+00	0.0000E+00	1.7000E+01	0.0000E+00	0.0000E+00	0.0000E+00			1.4939E-01				1.4042E+01FLOW0	
1.0000E+01				0.0000E+00	0.0000E+00			-9.7600E-02				-1.7168E+00FLOW0	
2.0000E+00	0.0000E+00	1.9000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		1.0683E-01				1.5280E+02FLOW0	
5.0000E+00	0.0000E+00		0.0000E+00	0.0000E+00	0.0000E+00			-3.0816E-01				-6.7133E+01FLOW0	
8.0000E+00				0.0000E+00	0.0000E+00			-3.0344E-01				-6.1254E+01FLOW0	
1.0000E+01	0.0000E+00	1.9000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.9447E-01				-8.0948E+01FLOW0	
2.0000E+01	0.0000E+00	2.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.1284E-01				3.0757E+01FLOW0	
5.0000E+00	0.0000E+00	2.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00			-2.3558E-01				-1.3136E+02FLOW0	
						0.0000E+00							
8.0000E+00	0.0000E+00	2.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00			-3.2293E-01				-5.5800E+01FLOW0	
1.0000E+01	0.0000E+00	2.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-3.3931E-01				-3.8145E+01FLOW0	
2.0000E+00	0.0000E+00	2.2000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-4.3968E-01				1.8726E+02FLOW0	
5.0000E+00	0.0000E+00	2.2000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.7060E-01				-6.9103E+01FLOW0	
8.0000E+00	0.0000E+00	2.2000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.1134E-01				-5.1720E+01FLOW0	
1.0000E+01	0.0000E+00	2.2000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.7696E-01				-5.7063E+01FLOW0	
2.0000E+00	0.0000E+00	2.3000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-3.4836E-01				3.2436E+02FLOW0	
5.0000E+00	0.0000E+00	2.3000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.8535E-01				-8.1873E+01FLOW0	
8.0000E+00	0.0000E+00	2.3000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.7357E-01				-9.2834E+01FLOW0	
1.0000E+01	0.0000E+00	2.3000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.3708E-01				-1.9927E+01FLOW0	
2.0000E+00	0.0000E+00	2.4000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	7.2942E+03	-1.3677E-01	1.3869E+04	1.8508E+01	-1.9565E+04	4.2725E+01FLOW0	041
5.0000E+00	0.0000E+00	2.4000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.6102E+03	-3.4078E-01	7.7461E+03	-4.5023E+01	-1.0826E+04	-6.4207E+01FLOW0	042
8.0000E+00	0.0000E+00	2.4000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.2776E+03	-2.3784E-01	6.9600E+03	-5.5822E+01	-9.7491E+03	-1.0107E+02FLOW0	043
1.0000E+01	0.0000E+00	2.4000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.3428E+03	-9.0526E-02	6.9818E+03	-4.4370E+01	-9.7856E+03	-9.0565E+01FLOW0	044
2.0000E+00	0.0000E+00	2.5000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	7.8908E+03	-1.8434E-01	1.4413E+04	5.9635E+01	-2.0449E+04	8.2965E+01FLOW0	045
5.0000E+00	0.0000E+00	2.5000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	5.0582E+03	-2.2518E-01				-1.2356E+02FLOW0	
8.0000E+00	0.0000E+00	2.5000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-3.0683E-01				-8.5163E+01FLOW0	
1.0000E+01	0.0000E+00	2.5000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.2971E-01				-1.8142E+01FLOW0	
2.0000E+00	0.0000E+00	2.6000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.0546E-01				1.8462E+02FLOW0	
5.0000E+00	0.0000E+00	2.6000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.3129E-01				-1.0709E+02FLOW0	
8.0000E+00	0.0000E+00	2.6000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-3.4925E-01				-1.9067E+01FLOW0	
1.0000E+01	0.0000E+00	2.6000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.7145E-01				-1.7030E+01FLOW0	
2.0000E+01	0.0000E+00	2.7000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.3410E-01				2.5826E+02FLOW0	
5.0000E+00	0.0000E+00	2.7000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.9345E-01				-6.7564E+01FLOW0	
8.0000E+00	0.0000E+00	2.7000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-7.6230E-02				4.6491E+00FLOW0	
1.0000E+01	0.0000E+00	2.7000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.0883E-01				-8.8851E+00FLOW0	
2.0000E+00	0.0000E+00	2.8000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-8.0966E-02				4.7072E+01FLOW0	
5.0000E+00	0.0000E+00	2.8000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.3428E-01				-1.9936E+01FLOW0	
8.0000E+00	0.0000E+00	2.8000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.2491E-01				-3.9873E+01FLOW0	
1.0000E+01	0.0000E+00	2.8000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-3.5808E-01				-1.0509E+02FLOW0	
2.0000E+00	0.0000E+00	2.9000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.2561E-01				9.8578E+00FLOW0	
5.0000E+00	0.0000E+00	2.9000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	7.1043E+03	-6.8786E-02	9.9039E+03	-4.3480E+01	-1.4659E+04	-6.6512E+01FLOW0	062
8.0000E+00	0.0000E+00	2.9000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	6.7328E+03	-1.8545E-01	9.1468E+03	-4.8626E+01	-1.3610E+04	-7.6041E+01FLOW0	063
1.0000E+01	0.0000E+00	2.9000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-3.5008E-01				-1.1607E+02FLOW0	
2.0000E+00	0.0000E+00	3.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00			-2.2838E-01				1.4373E+02FLOW0	
5.0000E+00	0.0000E+00	3.0000E+01	0.0000E+00		0.0000E+00			-9.0311E-02				-3.5260E+01FLOW0	
8.0000E+00	0.0000E+00	3.0000E+01		0.0000E+00								-4.0729E+01FLOW0	
1.0000E+01			0.0000E+00									1.9123E+01FLOW0	
	0												

Listing 2.3 ZONAIR Solution File: FLOWi

(Only SHOWS a part of the file:FLOW0001)

```
1UVWCP 1P.5E16.9
              8
                         1517
                                          1517
1.150000095E-02.1.140511036E-02.1.132160425E-02.1.121962070E-02.1.105749607E-02
1.089066267E-02 1.077836752E-02 1.073867083E-02 1.065516472E-02 1.057207584E-02
1.048821211E-02.1.036757231E-02.1.022005081E-02.1.008641720E-02.9.999334812E-03
9.904801846E-03 9.859919548E-03 9.840309620E-03 9.849429131E-03 9.877979755E-03
9.944975376E-03 1.000589132E-02 1.011049747E-02 1.019603014E-02 1.032245159E-02
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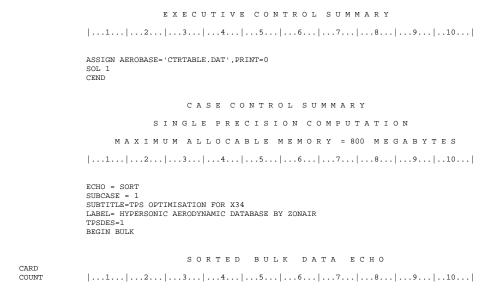
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• Output Data Listing

Listing 2.4 Standard Output File: X34TPS.OUT





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3 -		CONT	364	328	371						CONT
											CONT
4 -		CONT	764	768	771						
5 -		DESVAR	2	3	3						CONT
6 -	-	CONT	884	888	891						CONT
7 -	_	CONT	1164	1208	1211						CONT
8 -	_	CONT	1444	1448	1451						
9 .			3	3	3						CONT
		DESVAR									
10 -	-	CONT	17	24	29						CONT
11 -	_	CONT	97	264	229						CONT
12 -		CONT	457	464	469						
											CONTE
13 -		DESVAR	4	3	3						CONT
14 -	-	CONT	497	504	509						CONT
15 -	_	CONT	697	664	669						CONT
16		CONT	897	904	909						
											CONTE
17 -		DESVAR	5	3	3						CONT
18 -	-	CONT	937	944	949						CONT
19	_	CONT	1377	1304	1269						CONT
20		CONT	1457	1464	1469						
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21 -		DESVAR	6	2	2						CONT
22 -	-	CONT	30	40							CONT
23 -	_	CONT	190	200							
24		DESVAR	7	3	2						CONT
25		CONT	230	235	240						CONT
26 -	-	CONT	470	475	480						
27 -	_	DESVAR	8	3	3						CONT
28		CONT	510	513	516						CONT
29		CONT	670	673	676						CONT
30 -	-	CONT	830	833	836						
31 -	_	DESVAR	9	3	4						CONT
											CONT
32		CONT	870	873	876						
33 -	-	CONT	910	913	916						CONT
34	_	CONT	950	953	956						CONT
35			990	993	996						
		CONT									
36		DESVAR	10	3	3						CONT
37 -	-	CONT	1476	1473	1470						CONT
38 -	_	CONT	1236	1233	1270						CONT
											00111
39 -		CONT	1036	1033	1030						
40	-	DESVAR	11	3	2						CONT
41 -	_	CONT	877	677	517						CONT
42		CONT	880	680	520						
											~ ~
43		DESVAR	12	3	2						CONT
44	-	CONT	1000	1240	1480						CONT
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47 -			12	14	16						CONT
	-	CONT									
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48 49	- -	CONT CONT	372 772	214 774	136 776						CONT
48	- -	CONT CONT	372	214	136						
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48 · 49 · 50 · 51 · 52 · 53 · 6	- - - -	CONT CONT DESVAR CONT CONT CONT	372 772 14 892 1212 1452	214 774 3 894	136 776 3 896						CONT CONT CONT
48 49 50 51 52	- - - -	CONT CONT DESVAR CONT CONT	372 772 14 892 1212	214 774 3 894 1214	136 776 3 896 1376		IN	TECPLOT	X34_DYN.	DAT	CONT CONT CONT
48 · 49 · 50 · 51 · 52 · 53 · 6	- - - - -	CONT CONT DESVAR CONT CONT CONT	372 772 14 892 1212 1452	214 774 3 894 1214 1454	136 776 3 896 1376		IN	TECPLOT	X34_DYN.	DAT	CONT CONT CONT
48 · 49 · 50 · 51 · 52 · 53 · 54 · 55	- - - - - -	CONT CONT DESVAR CONT CONT CONT FEM CONT	372 772 14 892 1212 1452 101 X34_DYN	214 774 3 894 1214 1454	136 776 3 896 1376 1456	5					CONT CONT CONT CONT
48 49 50 51 52 53 54 55	- - - - - - -	CONT CONT DESVAR CONT CONT CONT FEM CONT PANLST2	372 772 14 892 1212 1452 101 X34_DYN 11	214 774 3 894 1214 1454	136 776 3 896 1376 1456	5	6	7	8	9	CONT CONT CONT CONT +CON
48 49 50 51 52 53 54 55 56	- - - - - - -	CONT CONT DESVAR CONT CONT CONT FEM CONT PANLST2 +CON	372 772 14 892 1212 1452 101 X34_DYN 11	214 774 3 894 1214 1454 .OUT	136 776 3 896 1376 1456	45	6 46	7 47	8 48	9 49	CONT CONT CONT CONT CONT +CON +CON
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48 49 50 51 52 53 54 55 56 57 58 59 60	- - - - - - - - - - -	CONT CONT DESVAR CONT CONT FEM CONT FANLST2 +CON +CON +CON +CON	372 772 14 892 1212 1452 101 X34_DYN 11 10 50 90 130	214 774 3 894 1214 1454 .OUT 11 51 91	136 776 3 896 1376 1456 4 4 44 84 124 164	45 85 125 165	6 46 86 126 166	7 47 87 127 167	8 48 88 128 168	9 49 89 129 169	CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON
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48 49 50 51 52 53 54 55 56 57 58 60 61 62 63 64 65 66		CONT CONT CONT CONT CONT FEM CONT FEM CONT +CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 1452 101 X34_DYN 11 10 50 90 130 170 210 250 290 330 370	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 251 291 331 371	136 776 3 896 1376 1456 4 4 4 4 124 164 204 244 284 324 404	45 85 125 165 205 245 285 325 365 405	6 46 86 126 166 206 246 286 326 366 406	7 47 87 127 167 207 247 287 327 367 407	8 48 88 128 168 208 248 288 328 368 408	9 49 89 129 169 209 249 289 329 369 409	CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67		CONT CONT CONT CONT CONT CONT FEM CONT FEM CONT +CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 1452 101 X34_DYN 11 0 50 90 130 170 210 250 290 330 370 410	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 221 291 331 371 411	136 776 3 896 1376 1456 4 444 84 124 164 204 244 324 364 404 444	45 85 125 165 205 245 285 325 365 405 445	6 46 86 126 166 206 246 286 326 366 406 446	7 47 87 127 167 207 247 287 327 367 407 447	8 48 88 128 168 208 248 288 328 368 408 448	9 49 89 129 169 209 249 289 329 369 409 449	CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68	-	CONT CONT CONT CONT CONT CONT CONT FEM CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 1452 101 10 50 90 130 170 2210 250 290 370 410 4450	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 221 221 291 331 371 411 451	136 776 3 896 1376 1456 4 44 84 1124 1124 1124 1124 1124 1124 1	45 85 125 165 205 245 285 325 365 405 445 485	6 46 86 126 166 206 246 236 326 366 406 446 486	7 47 87 127 167 207 247 287 327 367 407 447 487	8 48 88 128 168 208 248 248 328 368 408 448 448	9 49 89 129 169 209 249 289 329 369 409 449 489	CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69		CONT CONT CONT DESVAR CONT CONT FEM CONT FEM CONT +CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 101 X34_DYN 11 10 50 90 130 170 250 290 330 370 410 450 490	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 251 291 331 371 411 451 491	136 776 3 896 1376 1456 4 44 44 164 204 244 284 324 404 444 444 452	45 85 125 165 205 245 285 325 365 405 445 485 525	6 46 86 126 166 206 246 246 326 366 406 446 446 486 526	7 47 87 127 167 207 247 247 327 367 407 447 447 487 527	8 48 88 128 168 208 248 248 288 328 368 408 448 448 488 528	9 49 89 129 169 209 249 289 329 369 409 449 489 529	CONT CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68		CONT CONT CONT CONT CONT CONT CONT FEM CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 1452 101 10 50 90 130 170 2210 250 290 370 410 4450	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 221 221 291 331 371 411 451	136 776 3 896 1376 1456 4 44 84 1124 1124 1124 1124 1124 1124 1	45 85 125 165 205 245 285 325 365 405 445 485	6 46 86 126 166 206 246 236 326 366 406 446 486	7 47 87 127 167 207 247 287 327 367 407 447 487	8 48 88 128 168 208 248 248 328 368 408 448 448	9 49 89 129 169 209 249 289 329 369 409 449 489	CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
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48 49 50 51 52 53 54 55 56 57 58 60 61 62 63 64 65 66 67 68 69 70		CONT CONT CONT CONT CONT CONT FEM CONT CONT FEM CONT CONT CONT CON CON CON CON CON CON CON CON CON CON	372 772 14 892 1212 1452 101 130 50 90 130 170 2210 250 290 330 370 410 450 490 550 570	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 251 291 331 371 411 451 491 551 571	136 776 3 896 1376 1456 4 44 84 1124 1124 1124 1124 1124 1124 1	45 85 125 165 205 245 285 325 365 405 445 485 525 565 605	6 46 86 126 126 206 2246 286 326 366 446 446 446 456 526 606	7 47 87 127 167 207 247 287 327 367 447 447 487 527 567 607	8 48 88 128 168 208 248 328 368 408 448 488 528 568 608	9 49 89 129 169 209 249 289 329 409 449 449 489 529 569 609	CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72		CONT CONT CONT CONT CONT CONT FEM CONT FEM CONT +CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 101 1452 101 10 50 90 130 170 250 250 290 330 370 410 450 490 530 570 610	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 251 291 331 371 411 451 491 531 571 611	136 776 3 896 1376 1456 4 44 44 164 204 244 284 324 404 444 45 524 564 604 604	45 85 125 165 205 245 325 365 405 445 485 525 566 605 645	6 46 86 126 166 2206 246 286 366 406 446 486 526 566 606 646	7 47 87 127 167 207 247 287 367 407 447 447 527 567 607 647	8 48 88 128 128 168 208 248 368 408 448 448 528 568 6608 648	9 49 89 129 169 209 249 369 409 449 449 489 529 569 609 649	CONT CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
48 49 50 51 52 53 54 55 56 57 60 61 62 63 64 65 66 67 70 71 72 73 73		CONT CONT CONT CONT CONT CONT CONT FEM CONT FANLST2 CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 1452 101 10 50 90 130 130 170 210 250 330 370 410 450 490 570 6650	214 7774 3 894 1214 1454 .OUT 11 51 91 131 171 221 251 291 331 371 491 451 491 5531 571 6611 6651	136 776 3 896 1376 1456 4 44 44 124 164 204 224 234 364 404 444 484 524 564 604 668	45 85 125 165 205 245 285 365 405 445 525 565 605 645 685	6 46 86 126 126 206 246 326 326 326 346 446 446 556 606 646 686	7 47 87 127 167 207 247 247 327 367 447 447 487 567 607 647 687	8 48 88 128 1168 208 248 248 328 368 448 448 456 608 608 668 668 688	9 49 89 129 169 209 249 329 329 369 449 449 489 569 609 649 689	CONT CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72		CONT CONT CONT CONT CONT CONT FEM CONT FEM CONT +CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 101 1452 101 10 50 90 130 170 250 250 290 330 370 410 450 490 530 570 610	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 251 291 331 371 411 451 491 531 571 611	136 776 3 896 1376 1456 4 44 44 164 204 244 284 324 404 444 45 524 564 604 604	45 85 125 165 205 245 325 365 405 445 485 525 566 605 645	6 46 86 126 166 2206 246 286 366 406 446 486 526 566 606 646	7 47 87 127 167 207 247 287 367 407 447 447 527 567 607 647	8 48 88 128 128 168 208 248 368 408 448 448 528 568 6608 648	9 49 89 129 169 209 249 369 409 449 449 489 529 569 609 649	CONT CONT CONT CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
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48 49 49 50 51 52 53 54 55 56 57 58 60 61 62 63 64 77 77 78 78 79 80 81 82 83 84 85 86 87 78 88		CONT CONT CONT CONT CONT CONT CONT FEM CONT FEM CONT CONT FEM CON CON CON CON CON CON CON CON CON CON	372 772 14 892 1212 1452 101 1452 101 10 90 130 130 130 130 130 450 450 490 450 490 770 12 764 21 890 930 970 1010 1050 1090 1130 1130 1130 1130 1130 11210	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 251 291 331 371 451 491 571 661 661 661 661 671 771 768 891 931 971 1011 1051 1091 1131 1171 1211	136 776 3 896 1376 1456 4 44 44 124 164 204 2244 2244 234 364 404 444 484 524 604 6684 724 764 4 771 884 924 1004 1124 1164 1124 1164 1124 1164 1124 1164 1124 1164 1124 1164 1124 1164 116	45 85 125 165 205 245 285 3365 405 445 485 525 605 645 725 765 8 885 925 1045 1085 1125 1165 1125 1165 1245	6 46 86 126 126 206 246 2286 326 326 346 446 446 45 556 606 606 606 726 726 726 726 11 886 926 1006 1046 1126 1126 1126 1126 1126 1126 1126 11	7 47 87 127 167 207 247 247 327 367 447 487 567 607 647 687 727 767 364 887 927 1007 1047 1007 1127 1127 1127	8 48 48 88 128 168 208 248 328 368 448 488 568 608 448 688 728 728 728 728 728 728 728 728 728 7	9 49 49 89 129 169 209 249 249 369 449 489 5529 569 6649 689 7769 371 889 929 1009 1049 1129 1169 1129	CONT CONT CONT CONT CONT CONT CONT CONT
48 49 49 50 51 52 53 54 55 56 56 66 67 68 69 70 71 77 77 78 78 79 80 81 82 83 84 85 86 87 88 89 90 90 90 90 90 90 90 90 90 90 90 90 90		CONT CONT CONT CONT CONT CONT CONT CONT	372 772 14 892 101 1212 1452 101 10 90 130 130 130 250 330 370 410 450 450 650 660 650 660 650 670 770 12 890 770 12 890 1010 1050 1090 1130 1170 1210 1250 1290	214 774 3 894 1211 1454 .OUT 11 51 91 131 171 211 251 331 371 491 5531 571 691 768 891 971 1011 1051 1091 1131 1171 1211 1251	136 776 3 896 1376 1456 4 44 44 124 164 204 224 234 364 404 444 484 5564 604 664 67 771 884 924 104 104 104 104 104 1124 1124 1124 11	45 85 125 165 205 245 285 325 405 445 525 565 645 685 765 8 885 9925 965 1005 1045 1085 1125 1125 1125 1205 1245 1245 1245 1245 1255 1245 1255 1265	6 446 86 126 126 126 246 246 326 326 346 445 486 556 66 606 646 646 686 726 11 886 926 926 1046 1046 1126 1126 1126 1126 1246 1236 1236	7 47 87 127 167 207 247 2287 327 367 4407 447 487 5527 567 6647 687 727 7767 364 887 727 7067 364 1007 1007 1007 1007 1127 11207 1247 1227 1247 1247 1247 1247 1247 124	8 48 48 88 128 168 208 248 248 248 328 368 449 448 488 568 608 6648 328 328 328 328 328 328 328 328 328 32	9 49 89 129 169 209 249 249 329 369 449 489 559 569 6649 689 7769 371 889 9929 9969 1009 101	CONT CONT CONT CONT CONT CONT CONT CONT
48 49 49 50 51 52 53 54 55 56 57 58 60 61 62 63 64 65 66 67 70 71 72 73 74 75 76 77 78 80 81 82 83 84 85 86 87 90 90 91 91 91		CONT CONT CONT CONT CONT CONT CONT FEM CONT FEM CON CONT FALST2 CON CON CON CON CON CON CON CON CON CON	372 772 14 892 1212 1452 101 150 90 130 130 130 130 170 250 250 2330 370 410 450 450 650 660 6730 6770 12 764 21 890 930 1010 1050 1010 1050 1090 1130 1130 11210 1250 1220 12330	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 251 291 331 371 411 451 491 571 661 691 731 768 891 931 971 1001 1001 11091 1131 1171 1211 1251 1291 1331	136 776 3 896 1376 1456 4 44 44 124 164 204 244 224 364 404 444 484 524 604 644 724 771 884 924 964 1004 1044 1124 1164 1124 1164 1124 1124 1124 11	45 85 125 125 205 2245 285 3365 405 445 485 525 605 645 725 765 8 885 925 1005 1045 1085 1125 1125 1125 11265 11265	6 446 86 126 126 126 126 1286 326 366 446 486 5566 606 646 686 726 726 11 886 926 1046 1126 1126 1126 1126 1246 1286 1326 13366	7 47 87 127 167 207 247 247 327 367 447 487 567 607 647 687 727 767 364 887 927 1007 1047 1007 1127 1127 1127 1247 1287 1287 1287 1287 1287	8 48 88 128 168 208 248 328 368 448 488 568 608 448 688 728 888 928 968 1008 1048 1128 1128 1128 1128 1128 1128 1128 11	9 49 49 89 129 129 1369 129 1369 129 1369 129 1369 129 1369 129 1369 129 1369 129 1369 1369 1369 1369 1369	CONT CONT CONT CONT CONT CONT CONT CONT
48 49 49 50 51 52 53 54 55 66 67 62 63 64 65 66 67 71 72 73 74 75 76 81 82 83 84 85 86 87 88 99 90 91 92		CONT CONT CONT CONT CONT CONT CONT FEM CONT FEM CONT CONT FEM CON CON CON CON CON CON CON CON CON CON	372 772 14 892 1212 1452 101 150 50 90 130 170 250 290 410 250 290 410 450 450 450 450 660 670 730 770 712 764 21 890 930 970 1010 1050 1170 1250 1290 1130 1170 1250 1290 1130 1170	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 2211 2211 251 331 371 411 451 491 531 571 661 6691 731 771 768 891 931 1011 1051 1091 1131 1171 1251 1291 1331 1371	136 776 3 896 1376 1456 4 44 44 84 164 204 2244 2244 2244 2244 404 4444 4524 564 5604 664 664 6724 764 4 771 8924 964 1004 1104 100	45 85 125 125 205 2245 2285 325 325 405 445 425 525 565 6605 645 685 765 8 8 888 925 965 1045 1045 1125 1125 1125 11285	6 446 86 126 126 126 126 126 126 126 126 126 12	7 47 87 167 207 2247 2287 327 407 447 4487 527 567 607 647 687 727 767 364 887 727 1007 1047 1087 1127 1167 1227 1227 1327 1327 1327 13407	8 48 88 88 88 128 168 248 248 248 408 448 4528 568 648 648 688 768 328 328 328 368 8408 448 4528 108 108 128 128 128 128 128 128 1328 1328 1368 1408	9 49 49 89 129 169 209 249 249 449 449 449 459 669 649 689 769 371 889 969 1009 1049 1089 1129 1169 1249 1329 13369 1409	CONT CONT CONT CONT CONT CONT CONT CONT
48 49 49 50 51 52 53 54 55 56 57 58 60 61 62 63 64 65 66 67 70 71 72 73 74 75 76 77 78 80 81 82 83 84 85 86 87 90 90 91 91 91		CONT CONT CONT CONT CONT CONT CONT FEM CONT FEM CON CONT FALST2 CON CON CON CON CON CON CON CON CON CON	372 772 14 892 1212 1452 101 150 90 130 130 130 130 170 250 250 2330 370 410 450 450 650 660 6730 6770 12 764 21 890 930 1010 1050 1010 1050 1090 1130 1130 11210 1250 1220 12330	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 251 291 331 371 411 451 491 571 661 691 731 768 891 931 971 1001 1001 11091 1131 1171 1211 1251 1291 1331	136 776 3 896 1376 1456 4 44 44 124 164 204 244 224 364 404 444 484 524 604 644 724 771 884 924 964 1004 1044 1124 1164 1124 1164 1124 1124 1124 11	45 85 125 125 205 2245 285 3365 405 445 485 525 605 645 725 765 8 885 925 1005 1045 1085 1125 1125 1125 11265 11265	6 446 86 126 126 126 126 1286 326 366 446 486 5566 606 646 686 726 726 11 886 926 1046 1126 1126 1126 1126 1246 1286 1326 13366	7 47 87 127 167 207 247 247 327 367 447 487 567 607 647 687 727 767 364 887 927 1007 1047 1007 1127 1127 1127 1247 1287 1287 1287 1287 1287	8 48 88 128 168 208 248 328 368 448 488 568 608 448 688 728 888 928 968 1008 1048 1128 1128 1128 1128 1128 1128 1128 11	9 49 49 89 129 129 1369 129 1369 129 1369 129 1369 129 1369 129 1369 129 1369 129 1369 1369 1369 1369 1369	CONT CONT CONT CONT CONT CONT CONT CONT
48 49 50 51 52 53 54 55 66 57 68 69 67 70 71 72 73 74 75 76 77 78 80 81 82 83 84 85 86 87 88 88 89 89 80 80 80 80 80 80 80 80 80 80		CONT CONT CONT CONT CONT CONT CONT FEM CONT CONT FANLST2 CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 1452 101 10 90 130 130 130 250 370 410 450 490 570 6650 6650 6650 6650 6770 12 890 770 12 890 1010 1050 1090 1110 1170 1210 1250 1090 1130 1170 1210 1290 1330 1330 13410	214 774 3 894 1214 1454 .OUT 11 51 91 131 1251 171 2211 251 371 491 571 6651 6691 771 768 891 971 1051 1091 1131 1171 1211 1251 1291 1331 1331 1331 1331 1331 1331 133	136 776 3 896 1376 1456 4 44 44 84 164 204 2244 2244 2244 2244 404 4444 4524 564 5604 664 664 6724 764 4 771 8924 964 1004 1104 100	45 85 125 125 205 2245 2285 325 325 405 445 425 525 565 6605 645 685 765 8 8 888 925 965 1045 1045 1125 1125 1125 11285	6 446 86 126 126 126 126 126 126 126 126 126 12	7 47 87 167 207 2247 2287 327 407 447 4487 527 567 607 647 687 727 767 364 887 727 1007 1047 1087 1127 1167 1227 1227 1327 1327 1327 13407	8 48 88 88 88 128 168 248 248 248 408 448 4528 568 648 648 688 768 328 328 328 368 8408 448 4528 108 108 128 128 128 128 128 128 1328 1328 1368 1408	9 49 49 89 129 169 209 249 249 449 449 449 459 669 649 689 769 371 889 969 1009 1049 1089 1129 1169 1249 1329 13369 1409	CONT CONT CONT CONT CONT CONT CONT CONT
48 49 49 50 51 52 53 54 55 56 57 58 60 61 62 63 64 65 66 67 70 71 72 73 74 75 76 77 78 80 81 82 83 84 85 86 87 90 90 91 92 93 94		CONT CONT CONT CONT CONT CONT CONT FEM CONT FEM CON CONT FANLST2 CON CON CON CON CON CON CON CON CON CON	372 772 14 892 1212 1452 101 150 90 130 130 130 170 250 250 2330 370 410 450 450 650 690 770 12 890 930 121 890 930 1010 1050 1090 1130 1170 1250 1210 1250 12410 1250 1250 1270 1270 1270 1270 1270 1270 1270 127	214 774 3 894 1214 1454 .OUT 11 51 91 131 171 2211 2211 251 331 371 411 451 491 531 571 661 6691 731 771 768 891 931 1011 1051 1091 1131 1171 1251 1291 1331 1371	136 776 3 896 1376 1456 4 44 44 124 164 204 244 224 364 404 444 484 524 604 644 724 771 884 924 924 924 924 924 924 924 924 924 92	45 85 125 165 205 2245 2285 3365 405 445 525 605 645 725 765 8 8885 925 965 1005 1045 1125 1165 1205 1225 1245 1245 1245 1245 1245 1245 124	6 46 86 126 206 246 326 326 366 446 486 5526 566 646 686 726 726 11 886 926 1046 1126 1126 1126 1126 1126 11246 1286 1326 1446 1446	7 47 87 107 107 207 2247 2287 327 407 447 487 527 567 667 647 727 767 364 887 927 967 1007 1047 1087 11167 1227 1227 1227 1247 1247 1247 1247 124	8 48 88 88 88 168 208 248 248 248 248 408 448 528 568 6608 648 688 768 328 888 928 968 1048 1128 1168 11248 11288 11368 11448 11448	9 49 49 89 129 169 209 249 289 329 369 409 449 529 569 669 649 689 7729 769 371 888 992 969 1049 1089 1169 1249 1289 1329 1369 1449	CONT CONT CONT CONT CONT CONT CONT CONT
48 49 50 51 52 53 54 55 66 57 68 69 67 70 71 72 73 74 75 76 77 78 80 81 82 83 84 85 86 87 88 88 89 89 80 80 80 80 80 80 80 80 80 80		CONT CONT CONT CONT CONT CONT CONT FEM CONT CONT FANLST2 CON +CON +CON +CON +CON +CON +CON +CON	372 772 14 892 1212 1452 101 150 90 130 130 130 170 250 250 2330 370 410 450 450 650 690 770 12 890 930 121 890 930 1010 1050 1090 1130 1170 1250 1210 1250 12410 1250 1250 1270 1270 1270 1270 1270 1270 1270 127	214 774 3 894 1214 1454 .OUT 11 51 91 131 1251 171 2211 251 371 491 571 6651 6691 771 768 891 971 1051 1091 1131 1171 1211 1251 1291 1331 1331 1331 1331 1331 1331 133	136 776 3 896 1376 1456 4 44 44 84 164 204 2244 2244 2244 2244 404 4444 4524 564 5604 664 664 6724 764 4 771 8924 964 1004 1104 100	45 85 125 125 205 2245 2285 325 325 405 445 445 525 565 6605 645 685 765 8 8 888 925 965 1045 1045 1125 1125 1125 11285	6 446 86 126 126 126 126 126 126 126 126 126 12	7 47 87 167 207 2247 2287 327 407 447 4487 527 567 607 647 687 727 767 364 887 727 1007 1047 1087 1127 1167 1227 1227 1327 1327 1327 13407	8 48 88 88 88 128 168 248 248 248 408 448 4528 568 648 648 688 768 328 328 328 368 8408 448 4528 108 108 128 128 128 128 128 128 1328 1328 1368 1408	9 49 49 89 129 169 209 249 249 449 459 529 569 669 649 689 769 371 889 969 1009 1049 1089 1129 1169 1209 1249 1329 1369 1409	CONT CONT CONT CONT CONT CONT CONT CONT

96 -		1444	1448	1451	1.0	10	20	21	22	CONT
97 - 98 -	PANLST2 : +CON :	23	24	17 25	18 26	19 27	20 28	21 29	22 57	+CON +CON
99 -		58	59	60	61	62	63	64	65	+CON
100 -		66	67	68	69	97	98	99	100	+CON
101 -		101	102	103	104	105	106	107	108	+CON
102 -		109	137	138	139	140	141	142	143	+CON
103 -		144	145	146	147	148	149	177	178	+CON
104 - 105 -		179 187	180 188	181 189	182 217	183 218	184 219	185 220	186 221	+CON +CON
106 -		222	223	224	225	226	219	228	221	+CON +CON
107 -		257	258	259	260	261	262	263	264	+CON
108 -		265	266	267	268	269	297	298	299	+CON
109 -	+CON	300	301	302	303	304	305	306	307	+CON
110 -		308	309	337	338	339	340	341	342	+CON
111 -		343	344	345	346	347	348	349	377	+CON
112 -		378	379	380	381	382	383	384	385	+CON
113 - 114 -		386 421	387 422	388 423	389 424	417 425	418 426	419 427	420 428	+CON +CON
115 -		429	457	458	459	460	461	462	463	+CON
116 -		464	465	466	467	468	469			
117 -	PANLST2	32		17	24	29	97	264	229	+CON
118 -		457	464	469						
119 -	PANLST2			497	498	499	500	501	502	+CON
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123 -		546 581	582	583	584	585	586	587	588	+CON +CON
124 -		589	617	618	619	620	621	622	623	+CON
125 -		624	625	626	627	628	629	657	658	+CON
126 -		659	660	661	662	663	664	665	666	+CON
127 -	+CON	667	668	669	697	698	699	700	701	+CON
128 -		702	703	704	705	706	707	708	709	+CON
129 -		737	738	739	740	741	742	743	744	+CON
130 - 131 -		745 780	746 781	747 782	748 783	749 784	777 785	778 786	779 787	+CON +CON
132 -		788	789	817	818	819	820	821	822	+CON
133 -		823	824	825	826	827	828	829	857	+CON
134 -		858	859	860	861	862	863	864	865	+CON
135 -	+CON 8	866	867	868	869	897	898	899	900	+CON
136 -		901	902	903	904	905	906	907	908	+CON
137 -		909		407	607	007	F 0.1	701	0.01	GONTE
138 - 139 -	PANLST2 4	42 504	664	497 904	697 507	897 707	501 907	701 509	901 589	CONT
140 -		669	789	909	307	707	301	309	309	CONT
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143 -	+CON S	978	979	980	981	982	983	984	985	+CON
144 -		986	987	988	989	1017	1018	1019	1020	+CON
145 -		1021	1022	1023	1024	1025	1026	1027	1028	+CON
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149 -		1107	1108	1109	1137	1138	1139	1140	1141	+CON
150 -	+CON	1142	1143	1144	1145	1146	1147	1148	1149	+CON
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152 -		1185	1186	1187	1188	1189	1217	1218	1219	+CON
153 -			1221	1222	1223	1224	1225	1226	1227	+CON
154 - 155 -			1229 1264	1257 1265	1258 1266	1259 1267	1260 1268	1261 1269	1262 1297	+CON +CON
156 -		1298	1299	1300	1301	1302	1303	1304	1305	+CON
157 -			1307	1308	1309	1337	1338	1339	1340	+CON
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159 -	+CON	1349	1377	1378	1379	1380	1381	1382	1383	+CON
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164 -	PANLST2 !		1403	937	944	949	1377	1304	1269	+CON
165 -		1457	1464	1469						
166 -	PANLST2	61		30	31	32	33	34	35	+CON
167 -		36	37	38	39	40	70	71	72	+CON
168 -		73	74	75	76	77	78	79	80	+CON
169 - 170 -		110	111	112	113	114 151	115	116	117 154	+CON
171 -		118 155	119 156	120 157	150 158	151	152 160	153 190	191	+CON +CON
172 -		192	193	194	195	196	197	198	199	+CON
173 -		200								
174 -	PANLST2	62		30	40	190	200			
175 -	PANLST2 '			230	231	232	233	234	235	+CON
176 -		236	237	238	239	240	270	271	272	+CON
177 -		273	274	275	276	277	278	279	280	+CON
178 - 179 -		310 318	311 319	312 320	313 350	314 351	315 352	316 353	317 354	+CON +CON
180 -		355	356	357	358	359	360	390	391	+CON
181 -		392	393	394	395	396	397	398	399	+CON
182 -	+CON	400	430	431	432	433	434	435	436	+CON
183 -		437	438	439	440	470	471	472	473	+CON
184 -		474	475	476	477	478	479	480	225	0037
185 - 186 -	PANLST2 CONT	72 355	475	230 238	350 358	470 478	312 240	392 360	235 480	CONT
186 -	PANLST2		113	510	511	478 512	513	514	515	+CON
188 -		516	550	551	552	553	554	555	556	+CON
189 -		590	591	592	593	594	595	596	630	+CON
190 -		631	632	633	634	635	636	670	671	+CON

191 - 192 -										
	+CON	672	673	674	675	676	710	711	712	+CON
	+CON	713	714	715	716	750	751	752	753	+CON
193 -	+CON	754	755	756	790	791	792	793	794	+CON
194 -	+CON	795	796	830	831	832	833	834	835	+CON
			190	030	031	032	033	034	033	+CON
195 -	+CON	836					==0			
196 -	PANLST2			510	590	670	750	830	512	CONT
197 -	CONT	632	752	832	513	673	833	514	634	CONT
198 -	CONT	754	834	635	715	795	516	596	676	CONT
199 -	CONT	756	836							
200 -	PANLST2	91		870	871	872	873	874	875	+CON
201 -	+CON	876	910	911	912	913	914	915	916	+CON
202 -	+CON	950	951	952	953	954	955	956	990	+CON
203 -	+CON	991	992	993	994	995	996	,,,,	,,,	
204 -	PANLST2		JJ2	870	910	950	990	871	951	CONT
			000							
205 -	CONT	912	992	873	913	953	993	874	954	CONT
206 -	CONT	915	995	876	916	956	996			
207 -	PANLST2			1030	1031	1032	1033	1034	1035	+CON
208 -	+CON	1036	1070	1071	1072	1073	1074	1075	1076	+CON
209 -	+CON	1110	1111	1112	1113	1114	1115	1116	1150	+CON
210 -	+CON	1151	1152	1153	1154	1155	1156	1190	1191	+CON
211 -	+CON	1192	1193	1194	1195	1196	1230	1231	1232	+CON
212 -	+CON	1233	1234	1235	1236	1270	1271	1272	1273	+CON
213 -	+CON	1274	1275	1276	1310	1311	1312	1313	1314	+CON
214 -	+CON	1315	1316	1350	1351	1352	1353	1354	1355	+CON
215 -	+CON	1356	1390	1391	1392	1393	1394	1395	1396	+CON
216 -	+CON	1430	1431	1432	1433	1434	1435	1436	1470	+CON
217 -	+CON	1471	1472	1473	1474	1475	1476			
218 -	PANLST2			1476	1473	1470	1236	1233	1270	+CON
219 -	+CON	1036	1033	1030						
220 -	PANLST2	111		517	518	519	520	557	558	+CON
221 -	+CON	559	560	597	598	599	600	637	638	+CON
222 -	+CON	639	640	677	678	679	680	717	718	+CON
223 -	+CON	719	720	757	758	759	760	797	798	+CON
224 -	+CON	799	800	837	838	839	840	877	878	+CON
225 -	+CON +CON		880	037	030	033	040	077	070	+ COIN
		879	880							
226 -	PANLST2			877	677	517	838	758	598	CONT
227 -	CONT	719	639	880	760	680	600	520		
228 -	PANLST2			997	998	999	1000	1037	1038	+CON
229 -	+CON	1039	1040	1077	1078	1079	1080	1117	1118	+CON
230 -	+CON	1119	1120	1157	1158	1159	1160	1197	1198	+CON
231 -	+CON	1199	1200	1237	1238	1239	1240	1277	1278	+CON
232 -	+CON	1279	1280	1317	1318	1319	1320	1357	1358	+CON
233 -	+CON	1359	1360	1397	1398	1399	1400	1437	1438	+CON
234 -	+CON	1439	1440	1477	1478	1479	1480	1137	1130	1 COI
			1440					1007	1 477	
235 -	PANLST2			1000	1240	1480	997	1237	1477	
236 -	PANLST2			12	13	14	15	16	52	+CON
237 -	+CON	53	54	55	56	92	93	94	95	+CON
238 -	+CON	96	132	133	134	135	136	172	173	+CON
239 -	+CON	174	175	176	212	213	214	215	216	+CON
240 -	+CON	252	253	254	255	256	292	293	294	+CON
241 -	+CON	295	296	332	333	334			372	+CON
242 -	, COI									
	+COM						335	336		
	+CON	373	374	375	376	412	413	414	415	+CON
243 -	+CON	373 416	374 452	375 453	376 454	412 455	413 456	414 492	415 493	+CON +CON
243 - 244 -	+CON +CON	373 416 494	374 452 495	375 453 496	376 454 532	412 455 533	413 456 534	414 492 535	415 493 536	+CON +CON +CON
243 - 244 - 245 -	+CON +CON +CON	373 416 494 572	374 452 495 573	375 453 496 574	376 454 532 575	412 455 533 576	413 456 534 612	414 492 535 613	415 493 536 614	+CON +CON +CON +CON
243 - 244 - 245 - 246 -	+CON +CON +CON	373 416 494 572 615	374 452 495 573 616	375 453 496 574 652	376 454 532 575 653	412 455 533 576 654	413 456 534 612 655	414 492 535 613 656	415 493 536 614 692	+CON +CON +CON +CON
243 - 244 - 245 - 246 - 247 -	+CON +CON +CON	373 416 494 572	374 452 495 573 616 694	375 453 496 574 652 695	376 454 532 575 653 696	412 455 533 576 654 732	413 456 534 612	414 492 535 613	415 493 536 614	+CON +CON +CON +CON
243 - 244 - 245 - 246 -	+CON +CON +CON	373 416 494 572 615	374 452 495 573 616	375 453 496 574 652	376 454 532 575 653	412 455 533 576 654	413 456 534 612 655	414 492 535 613 656	415 493 536 614 692	+CON +CON +CON +CON
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287	-	STTYPE	23	3	103	103	103				CONT
288		CONT	0.12	0.11	0.095	0.75	0.3				
289 290		STTYPE	0.08	4 0.08	114	114	127 0.8				CONT
291		STTYPE	25	1	101	1.0	0.0				CONT
292		CONT	0.1								
293		STTYPE	31 0.08	6	221						CONT
294 295		CONT STTYPE	32	1	266						CONT
296		CONT	0.18	-	200						00111
297		STTYPE	33	6	260						CONT
298 299		CONT STTYPE	2.0	1	266						CONT
300		CONT	0.11	1	200						CONT
301		STTYPE	35	6	245						CONT
302		CONT	0.1								
303 304		STTYPE	36 0.15	1	101						CONT
305		THERMPR		1							
306		TIMESP		100.	200.	300.	400.	500.	600.	700.	CONT
307 308		CONT TPSDES	800. 1	900. 1	1000. 1	1100. 2	101				CONT
309		CONT	1	2	3	4	5	6	7	8	CONT
310		CONT	9	10	11	12	13	14			
311		TPSSYM		1	4	4					CONT
312 313		CONT	1	21 23	0.08	2. 1.5					CONT
314		CONT	1	24	0.4	1.3					CONT
315		CONT	0	25	0.1	1.2					
316 317		TPSSYM	2	2 21	4 0.08	4 2.					CONT
318		CONT	2	23	0.08	1.5					CONT
319		CONT	2	24	0.4	1.3					CONT
320		CONT	0	25	0.1	1.2					
321 322		TPSSYM CONT	3	3 31	6 0.05	4 1.					CONT
323		CONT	3	32	0.08	0.6					CONT
324	-	CONT	3	33	1.00	3.					CONT
325		CONT	3	34	0.05	0.5					CONT
326 327		CONT	3	35 36	0.05 0.1	0.5					CONT
328			4	4	6	4					CONT
329		CONT	4	31	0.05	1.					CONT
330		CONT	4	32	0.08	0.6					CONT
331 332		CONT	4	33 34	1.00	3. 0.5					CONT
333		CONT	4	35	0.05	0.5					CONT
334		CONT	0	36	0.1	0.2					
335 336		TPSSYM CONT	5 5	5 31	6 0.05	4					CONT
337		CONT	5	32	0.03	0.6					CONT
338	-	CONT	5	33	1.00	3.					CONT
339		CONT	5	34	0.05	0.5					CONT
340 341		CONT	5 0	35 36	0.05	0.5					CONT
342		TPSSYM	6	6	6	4					CONT
343		CONT	6	31	0.05	1.					CONT
344 345		CONT	6 6	32 33	0.08	0.6 3.					CONT
346		CONT	6	34	0.05	0.5					CONT
347		CONT	6	35	0.05	0.5					CONT
348		CONT	0	36	0.1	0.2					
349 350		TPSSYM CONT	7 7	7 31	6 0.05	4 1.					CONT
351			7			0.6					CONT
352		CONT	7	33	1.00	3.					CONT
353 354			7 7	34 35		0.5					CONT
355				36		0.3					COINT
356	-	TPSSYM	8	8	6	4					CONT
357				31	0.05	1. 0.6					CONT
358 359		CONT	8	32 33	0.08						CONT
360		CONT	8	34	0.05	0.5					CONT
361	-	CONT		35	0.05	0.5					CONT
362		CONT TPSSYM		36 9		0.2 4					COMP
363 364				9 21	0.08	2.					CONT
365	-	CONT	9	23	0.08	1.5					CONT
366				24	0.4	1.3					CONT
367 368		CONT TPSSYM		25 10		1.2					CONT
369		CONT		31		1.					CONT
370	-	CONT	10	32	0.08	0.6					CONT
371				33		3. 0.5					CONT
372 373		CONT	10 10	34 35		0.5					CONT
374			0	36		0.2					
375		TPSSYM		11		4					CONT
376 377		CONT	11 11	31 32		1. 0.6					CONT
378		CONT	11	33		3.					CONT
379	-	CONT	11	34	0.05	0.5					CONT
380	-	CONT	11	35	0.05	0.5					CONT

```
381 -
                                           0.1
                                                    0.2
              CONT
                                 36
382 -
              TPSSYM
                       12
                                 12
                                                                                                     CONT
383 -
              CONT
                       12
                                 31
                                           0.05
                                                                                                     CONT
                       12
384 -
              CONT
                                  32
                                           0.08
                                                    0.6
                                                                                                     CONT
                       12
12
385 -
              CONT
                                 33
                                           1.00
                                                                                                     CONT
              CONT
                                           0.05
                                                    0.5
386
                                  34
                                                                                                     CONT
              CONT
                        12
                                           0.05
                                                                                                     CONT
387
388 -
              CONT
                                 36
                                           0.1
                                                    0.2
              TPSSYM
                       13
                                 13
                                                                                                     CONT
390 -
              CONT
                       13
                                 31
                                           0.05
                                                                                                     CONT
391 -
                                                    0.6
              CONT
                       13
                                 32
                                           0.08
                                                                                                     CONT
392 -
              CONT
                        13
                                 33
                                           1.00
                                                                                                     CONT
393 -
              CONT
                       13
                                 34
                                           0.05
                                                    0.5
                                                                                                     CONT
394
              CONT
                        13
                                           0.05
                                                                                                     CONT
395 -
              CONT
                       0
                                 36
                                           0.1
                                                    0.2
              TPSSYM
                                 14
                                                                                                     CONT
                       14
14
397 -
              CONT
                                 31
                                           0.05
                                                                                                     CONT
398 -
                                                    0.6
              CONT
                                 32
                                           0.08
                                                                                                     CONT
399
              CONT
                       14
                                 33
                                           1.00
                                                                                                     CONT
400 -
              CONT
                       14
                                 34
                                           0.05
                                                    0.5
                                                                                                     CONT
              CONT
                                                                                                     CONT
402 -
              CONT
                       0
                                 36
                                           0.1
                                                    0.2
              TRAJCT
                                                                                                     CONT
404 -
              CONT
                        .00000E00.71871 .45600E64.0000 0.0
                                                                                                     CONT
405 -
                        .16000E20.98944 .41990E614.0000
                                                                                                     CONT
              CONT
              CONT
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                                            .43688E69.4208
                                                                                                     CONT
                        .49000E21.63429
.68000E22.17754
407 -
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                                                                                                     CONT
              CONT
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                                                                        TECPLOT CPTEMP1.PLT
                                                                                                     CONT
                                           .11358E73.6000
.14897E73.6000
409 -
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                        .88000E22.99306
                                                                                                     CONT
              CONT
                        .10800E34.03065
410
                                                                                                     CONT
                        .12800E35.30536
.14700E37.18387
                                           .18668E73.6000
.22489E78.7000
411 -
              CONT
                                                                                                     CONT
412 -
              CONT
                                                                                                     CONT
              CONT
                        .16500E38.14718
                                           .26307E710.2250
                                                                                                     CONT
414 -
              CONT
                        .18500E38.48577
                                           .29382E710.2250
                                                                                                     CONT
              CONT
                        .20500E38.73075 .31108E710.2250
416 -
              CONT
                        .22500E38.80061
                                           .31479E710.2250
                                                                        TECPLOT CPTEMP2 PLT
                                                                                                     CONT
                        .24500E38.62765 .30495E710.2250
417
              CONT
                                                                                                     CONT
                        .26300E38.35804 .28476E730.0000
.28300E37.92715 .25083E730.0000
.30300E37.42020 .20828E730.0000
418 -
              CONT
                                                                                                     CONT
419
              CONT
                                                                                                     CONT
420 -
              CONT
                                                                                                     CONT
421 -
              CONT
                        .32300E36.98630
                                           .17006E730.0000
                                                                                                     CONT
                        .34100E36.51451
                                           .15705E717.6576
              CONT
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423 -
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                        .35900E36.29482
.37900E36.12626
                                           .15555E711.3822
.15505E711.5945
                                                                                                     CONT
              CONT
424
                                                                                                     CONT
425 -
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                        .39900E35.96248
.41900E35.80340
                                           .15405E711.6852
                                                                                                     CONT
                                           .15256E711.6316
426 -
              CONT
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427 -
              CONT
                        .43900E35.64886
                                           .15063E711.4712
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428 -
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                        .45900E35.49856
                                           .14827E711.2120
                                                                                                     CONT
                        .47900E35.35216 .14551E710.8676
              CONT
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                        .49900E35.20938 .14237E710.4565 .51900E35.06993 .13890E79.9883
430 -
              CONT
                                                                                                     CONT
              CONT
431
                                                                                                     CONT
432 -
              CONT
                        .53900E34.92935 .13511E79.3991 .55900E34.78106 .13103E78.7931
                                                                                                     CONT
                                                                                                     CONT
433 -
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              CONT
                        .57900E34.62119
                                           .12670E78.2187
                                                                                                     CONT
434 -
435 -
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                        .59900E34.44764 .12216E77.6847
                                                                                                     CONT
436 -
              CONT
                        .61900E34.25902
                                           .11747E77.2020
                                                                                                     CONT
437 -
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                        .63900E34.05448
                                           .11267E76.7771
                                                                                                     CONT
                        .65900E33.82413
                                           .10782E76.3472
438 -
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                                                                                                     CONT
                        .67900E33.56631
.69900E33.28723
                                           .10300E75.9874
439 -
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440 -
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                                                                                                     CONT
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                                            .93312E64.8191
442 -
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.75600E32.29065
                                            .87329E64.1829
                                                                                                     CONT
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443
              CONT
                                                                        TECPLOT CPTEMP3.PLT
                                                                                                     CONT
                        .77600E31.86649
444 -
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                                            .72891E63.0646
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                                           .66074E63.0928
445
              CONT
                                                                                                     CONT
              CONT
                        .81600E31.14676
                                            .59940E63.3054
                                                                                                     CONT
446
447 -
              CONT
                        .83600E30.96665
                                           .54315E63.8323
                                                                                                     CONT
              CONT
                        .85600E30.86983
                                           .48792E63.8046
                                                                                                     CONT
449 -
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                        87400E30 80178
                                           43914E63 9110
                                                                                                     CONT
                        .89400E30.73186
              CONT
                                           .38870E63.9359
                                                                                                     CONT
              CONT
                        .91400E30.67432 .34157E63.9549 .93400E30.62713 .29712E63.9492
451 -
                                                                                                     CONT
452
                                                                                                     CONT
                                           .25488E63.9046
453 -
              CONT
                        .95400E30.58784
                                                                                                     CONT
                       .97400E30.55190
.99400E30.51899
                                           .21464E63.8498
.17633E63.8233
454 -
              CONT
                                                                                                     CONT
              CONT
                                                                                                     CONT
456 -
              CONT
                        .10140E40.48941
                                           .13984E63.8101
                                                                                                     CONT
457
              CONT
                        .10340E40.46307 .10502E63.8009
                                                                                                     CONT
458 -
              CONT
                        .10540E40.43975 .71741E53.7895
                                                                                                     CONT
459 -
              CONT
                        .10740E40.41915 .39891E53.7718
                                                                                                     CONT
460 -
              CONT
                        .10940E40.40098 .93915E43.7458
461 -
              TRJLST
463 -
              ENDDATA
```

```
* SUBCASE = 1 *
* DISCIPLINE = TPSDES *
* BULK ENTRY ID = 1 *
*
```

```
TOTAL NUMBER OF DESIGN VARIABLES = 27
TOTAL NUMBER OF CONSTRAINS = 1302
TOTAL NUMBER OF TEMP. CONSTRAINS = 396
 TOTAL NUMBER OF TEMP. PRINTOUTS = 11
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.4529E+03
               A
                         Α
               D
                          D
                                    C
                                                        C
                                                         D
                                                                             C
                                                                             D
                                                                                                  C
                                                                                       D
  0.0 -----
 -1.0 <sup>1</sup> + .10 .20 .30 .40
                                                                           .80 .90 1.00 1.10
                                            .50 .60 .70
TIME ( X 1.401E-44 )
           MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4
Tmax: 2300.33 350.33 800.33 300.33
Optv: 452.93 328.32 327.35 299.74
  VALUES OF DESIGN VARIABLES :
YER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09
1 0.21576 0.13816 0.11568 0.12286 0.14818 0.18607 0.19007 0.17043 0.10599
LAYER

    2
    0.31605
    0.40681
    0.32593
    0.35373
    0.35532
    0.41773
    0.66265
    0.38857
    0.32871

    3
    0.40000
    0.42400
    0.41852
    0.49062
    0.43617
    0.42690
    0.78345
    0.73465
    0.45898

THE ORIGINAL OBJECTIVE FUNCTION = 7760.2163086
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5185303
THE TOTAL OPTIMAL WEIGHT = 1.63459340E+06
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.5509E+00
  1.0 + A A A A
                  0.0 -----
 -1.0 +
                                         .42 .52 .62
TIME ( X 8.408E-44 )
                                                                       .72 .82 .92 1.02
            OPTIMAL STRUCTURES OF TPS FOR PATCH =
                 (WITH AVERAGE THICKNESS)
 _____
                                                     0.15480 in. 452.9 F
                   HRSI COAT
                                    slab
 -----
     0.12000 in. ALUMINUM 7075-T6
 i i i i 0.09500 in.
i i i ALUMINUM 7075-T6
```

```
i i i i i i i i i i i cell = 0.30000 in.
                                             honey comb 0.39506 in. 328.3 F
        0.11000 in. ALUMINUM 7075-T6
______
         0.08000 in. INCONEL 617
 v v ____ 0.12000 in.
v v v v v TITANIUM (6AL-4V)
v v v v v
v v v v v
                                          corrugated
                                                                  0.50815 in. 327.3 F
                   v pitch = 0.80000 in.
0.08000 in. INCONEL 617
                      ALUMINUM 2024-T4 slab
                                                                 0.10000 in. 299.7 F
-----
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                               LAYER02
          LAYER01
                                                    LAYER03
                                                                         LAYER04
 PANEL
                      446.48
                                                                327.83
297.95
          0.21576
                               0.31605
                                           350.33
                                                    0.40000
                                                                                     300.33
                     392.49
340.94
                                           319.47
289.33
                                                    0.40760
          0.19430
                               0.34945
                                                                         0.10000
                                                                                     276.36
                               0.37726
                                                    0.41438
                     293.38
251.78
                               0.39733
                                                    0.42001
0.42400
          0.15481
                                           260.58
                                                                241.24
                                                                         0.10000
                                                                                     229.83
                                           234.08
                                                                215.97
                                                                         0.10000
                                                                                     208.30
          0.13816
                     219.26
199.27
                               0.40188
                                           211.31
193.71
                                                                194.49
178.32
          0.12504
                                                    0.42570
                                                                         0.10000
                                                                                     189.15
     10
          0.11682
                                                    0.42428
                                                                         0.10000
                                                                                     173.34
          0.11568
                      197.38
                               0.32593
                                           183.83
                                                    0.41852
                                                                169.96
                                                                         0.10000
     44
          0.19221
                      426.12
                               0.30499
                                           349.49
                                                    0.40052
                                                                326.75
                                                                         0.10000
                                                                                     300.33
                      214.68
                               0.33624
                                           177.61
                                                    0.40292
                                                                176.97
                                                                         0.10000
                      332.12
288.71
     46
          0 16322
                               0.36320
                                           288.41
                                                    0.40596
                                                                268.16
                                                                         0.10000
                                                                                     252 64
     47
                                           259.80
          0.14959
                               0.38373
                                                    0.40900
                                                                240.76
                                                                         0.10000
                                                                                     229.81
     48
          0 13852
                      251.12
                               0.39421
                                           233.97
                                                    0.41045
                                                                216.10
                                                                         0.10000
                                                                                     208 74
     49
          0.13025
                      221.06
                               0.39665
                                           211.55
                                                    0.41513
                                                                194.74
                                                                         0.10000
                                                                                     189.56
     50
          0 12763
                      202.78
                               0.38118
                                           194.70
                                                    0.41674
                                                                178.85
                                                                         0.10000
                                                                                     174.01
     51
          0.13497
                      201.39
                               0.35004
                                           186.37
                                                    0.41802
                                                                171.02
                                                                         0.10000
                                                                                     164.02
                      408.09
                                                                         0.10000
          0.17076
                               0.29917
                                           348.86
                                                    0.40574
                                                                325.74
                                                                                     300.33
     85
          0.16081
                      364.57
322.93
                               0.32508
                                           317.74
287.63
                                                    0.40280
                                                                296.19
                                                                         0.10000
                                                                                     276.34
                               0.34884
                                                    0.40104
                                                                267.54
                                                                         0.10000
          0.15199
                                                                                     252.68
     86
     87
          0.14455
                      284.21
                               0.36885
                                           259.23
                                                    0.40068
                                                                240.45
                                                                         0.10000
                                                                                     229.94
                                           233.98
     88
          0.13961
                      250.82
                               0.38207
                                                    0.40125
                                                                216.30
                                                                         0.10000
                                                                                     209.16
                                                                                     190.28
     89
          0.13744
                      223.77
                               0.39017
                                           212.16
                                                    0.40506
                                                                195.30
                                                                         0.10000
     90
          0 14097
                      207 18
                               0 38623
                                           196 15
                                                    0 41000
                                                                179 73
                                                                         0 10000
                                                                                     175 05
                                                                         0.10000
          0.15315
                      205.31
                               0.37298
                                           188.92
                                                    0.41808
                                                                172.20
                                                                                     165.55
                                           204.26
317.12
    124
          0 15257
                      243.60
                               0.29999
                                                    0.41652
                                                                203.53
                                                                         0.10000
                                                                                     184.71
    125
          0.14690
                      353.34
                               0.32005
                                                    0.40965
                                                                295.36
                                                                         0.10000
                                                                                     276.28
    126
          0 14321
                      315.70
                               0.33931
                                           287.02
                                                    0.40370
                                                                266.94
                                                                         0.10000
                                                                                     252 61
                                                    0.39988
                                                                182.76
    127
          0.14108
                      205.83
                               0.35725
                                           183.34
                                                                         0.10000
                                                                                     169.75
                                                                                     209.42
          0.14129
                      250.75
                               0.37163
                                           233.98
                                                    0.39884
                                                                216.42
                                                                         0.10000
    128
    129
          0.14428
                      226.27
                               0.38402
                                           212.75
                                                    0.40089
                                                                195.83
                                                                         0.10000
                                                                                     190.88
    130
          0.15273
                      211.07
                               0.39009
                                           197.54
                                                    0.40725
                                                                180.65
                                                                         0.10000
                                                                                     176.06
    131
          0 16835
                      208.79
                               0 39243
                                           191.28
                                                    0 41890
                                                                173 45
                                                                         0 10000
                                                                                     167 11
                      382.78
                                           348.28
                                                    0.43309
                                                                324.01
                                                                         0.10000
                                                                                     300.33
    164
          0.13850
                               0.30816
    165
          0.13684
                      345.48
                               0.32184
                                           316.71
                                                    0.42369
                                                                294.56
                                                                         0.10000
                                                                                     276.09
                      310.70
    166
          0.13733
                               0.33545
                                           286.57
                                                    0.41424
                                                                266.34
                                                                         0.10000
                                                                                     252.38
    167
          0.13927
                      278.57
                               0.34985
                                           258.54
                                                    0.40720
                                                                239.89
                                                                         0.10000
    168
          0.14335
                      250.78
                               0.36370
                                           233.92
                                                    0.40408
                                                                216.39
                                                                         0.10000
                                                                                     209.42
                      228.23
                               0.37841
                                           213.21
    169
          0.15012
                                                    0.40354
                                                                196.23
                                                                         0.10000
                                                                                     191.26
    170
          0.16179
                      214.08
                               0.39187
                                           198.70
                                                    0.40908
                                                                181.48
                                                                         0.10000
                                                                                     176.94
          0.17916
    171
                      211.53
                               0.40665
                                           193.27
                                                    0.42053
                                                                174.69
                                                                         0.10000
                                                                                     168.59
          0.13022
                      377.24
                               0.32050
                                           348.30
                                                    0.45096
                                                                323.40
                                                                         0.10000
    204
                                                                                     300.33
    205
          0.13142
                      341.47
                               0.32837
                                           316.49
                                                    0.44043
                                                                293.91
                                                                         0.10000
                                                                                     275.82
          0.13451
                      308.12
                               0.33643
                                           286.28
                                                    0.42867
                                                                         0.10000
    206
    207
          0 13890
                      277 44
                               0 34687
                                           258 35
                                                    0 41916
                                                                239 59
                                                                         0 10000
                                                                                     229 61
    208
          0.14525
                      250.83
                               0.35906
                                           233.81
                                                    0.41402
                                                                216.23
                                                                         0.10000
                                                                                     209.23
    209
210
          0.15402
0.16701
                      229.37
215.81
                                           213.45
199.44
                                                    0.41073
0.41401
                                                                196.43
182.08
                                                                                     191.39
                               0.37419
                                                                         0.10000
                               0.39155
                                                                         0.10000
                                                                                     177.51
    211
          0.18444
                      213.17
                               0.41403
                                           194.59
                                                    0.42248
                                                                175.68
                                                                         0.10000
                                                                                     169.73
                      375.32
340.09
    244
          0.12674
                               0.33007
                                           348.36
                                                    0.46316
                                                                323.06
                                                                         0.10000
                                                                                     300.33
    245
                               0.33435
                                                    0.45248
                                                                         0.10000
          0.12938
                                           316.39
                                                                293.51
                      307.19
277.04
    246
          0.13365
                               0.33881
                                           286.13
                                                    0.43981
                                                                265.46
                                                                         0.10000
                                                                                     251.79
    247
          0.13914
                               0.34642
                                           258.24
                                                    0.42894
                                                                239.36
                                                                         0.10000
                                                                                     229.38
    248
          0.14647
                      250.86
                               0.35708
                                           233.72
                                                    0.42236
                                                                216.09
                                                                         0.10000
                                                                                     209.03
    249
          0.15594
                      229.83
                               0.37185
                                           213.54
                                                    0.41705
                                                                196.50
                                                                         0.10000
                                                                                     191.37
    250
          0.16915
                      216.52
                               0.39061
                                           199.77
                                                    0.41831
                                                                182.38
                                                                         0.10000
    251
          0.18602
                      213.87
                               0.41653
                                           195.22
                                                    0.42385
                                                                176.25
                                                                         0.10000
                                                                                     170.35
    284
          0.12501
                                           348.43
                                                    0.47184
                                                                322.85
                                                                         0.10000
                                                                                     300.33
    285
          0 12849
                      339.57
                               0 33915
                                           316.35
                                                    0 46131
                                                                293 25
                                                                         0 10000
                                                                                     275 46
                                                    0.44827
    286
          0.13342
                      306.82
                               0.34114
                                           286.04
                                                                265.21
                                                                         0.10000
                                                                                     251.58
    287
          0 13950
                      276.89
                               0.34668
                                           258.17
                                                    0.43653
                                                                239.20
                                                                         0.10000
                                                                                     229.19
                                           233.65
                                                    0.42892
                                                                215.98
                                                                         0.10000
    288
          0.14731
                      250.89
                               0.35609
                                                                                     208.86
    289
          0.15707
                      230.07
                               0.37036
                                           213.58
                                                    0.42207
                                                                196.52
                                                                         0.10000
                                                                                     191.34
    290
          0.17019
                      216.86
                               0.38971
                                           199.95
                                                    0.42167
                                                                182.56
                                                                         0.10000
                                                                                     177.92
                      214.22
                                           195.57
                                                    0.42483
                                                                          0.10000
    291
          0.18646
                               0.41745
                                                                176.61
    324
          0.12372
                      374.28
339.37
                               0.34517
                                           348.51
                                                    0.48101
                                                                322.64
                                                                         0.10000
                                                                                     300.33
          0.12797
                                           316.32
                                                    0.47083
                                                                292.99
                                                                         0.10000
                                                                                     275.28
    325
                               0.34464
    326
          0.13346
                      306.66
                               0.34406
                                           285.96
                                                    0.45754
                                                                264.96
                                                                          0.10000
                                                                                     251.35
                      276.83
                                           258.09
    327
          0.14001
                               0.34739
                                                    0.44497
                                                                239.01
                                                                         0.10000
                                                                                     228.98
                                           233.58
                                                    0.43627
    329
          0.15808
                      230.24
                               0.36891
                                           213.60
                                                    0.42778
                                                                196.53
                                                                         0.10000
                                                                                     191.27
```

330	0.17097	217.11	0.38859	200.10	0.42546	182.73	0.10000	178.05
331	0.18647	214.48	0.41783	195.88	0.42584	176.95	0.10000	171.10
364	0.12286	374.37	0.35373	348.61	0.49062	322.43	0.10000	300.33
365	0.12783	339.35	0.35062	316.19	0.48072	292.62	0.10000	275.01
366	0.13380	306.52	0.34753	285.72	0.46741	264.55	0.10000	250.98
367	0.14071	276.67	0.34856	257.84	0.45402	238.65	0.10000	228.60
368	0.14921	250.73	0.35495	233.28	0.44492	215.49	0.10000	208.26
369	0.15890	230.31	0.36770	213.57	0.43338	196.49	0.10000	191.17
370	0.17148	217.26	0.38727	200.22	0.42967	182.88	0.10000	178.15
371	0.18607	214.68	0.41773	196.14	0.42690	177.29	0.10000	171.45
404	0.12242	374.72	0.36375	348.55	0.50154	322.05	0.10000	300.12
405	0.12808	339.57	0.35783	315.97	0.49219	292.15	0.10000	274.63
406	0.13447	306.52	0.35180	285.41	0.47870	264.05	0.10000	250.50
407	0.14164	276.53	0.35026	257.50	0.46452	238.19	0.10000	228.11
408	0.15026	250.58	0.35481	232.99	0.45438	215.14	0.10000	207.84
409	0.15987	230.21	0.36636	213.40	0.44101	196.31	0.10000	190.91
410	0.17184	217.26	0.38599	200.24	0.43411	182.93	0.10000	178.14
411	0.18516	214.81	0.41705	196.39	0.42818	177.66	0.10000	171.83
444	0.12268	376.12	0.38012	348.50	0.51888	321.49	0.10000	299.78
445	0.12923	340.48	0.36992	315.62	0.51073	291.38	0.10000	273.98
446	0.13604	306.82	0.35929	284.88	0.49714	263.20	0.10000	249.68
447	0.14336	276.41	0.35365	256.92	0.48185	237.39	0.10000	227.26
448								207.09
	0.15191	250.26	0.35512	232.48	0.47005	214.51	0.10000	
449	0.16109	229.88	0.36449	213.07	0.45378	195.95	0.10000	190.42
450	0.17193	217.04	0.38339	200.18	0.44270	182.96	0.10000	178.07
451	0.18288	214.85	0.41493	196.69	0.43021	178.21	0.10000	172.37
484	0.12503	380.07	0.40772	348.49	0.54711	320.68	0.10000	299.24
485	0.13263	343.00	0.39076	314.96	0.54143	290.05	0.10000	272.79
486	0.13963	307.84	0.37273	283.85	0.52800	261.65	0.10000	248.15
487	0.14667	276.33	0.36045	255.78	0.51116	235.90	0.10000	225.67
488	0.15452	249.55	0.35668	231.45	0.49675	213.29	0.10000	205.68
489	0.16240	228.95	0.36198	212.35	0.47578	195.22	0.10000	189.45
490			0.37863	199.91	0.45744			
	0.17080	216.22				182.90	0.10000	177.81
491	0.17753	214.57	0.40943	196.94	0.43355	179.00	0.10000	173.12
524	0.12972	386.22	0.43913	348.54	0.57820	319.88	0.10000	298.62
525	0.13794	346.90	0.41460	314.21	0.57545	288.57	0.10000	271.39
526	0.14458	309.54	0.38858	282.64	0.56255	259.88	0.10000	246.33
527	0.15074	276.41	0.36906	254.44	0.54427	234.16	0.10000	223.78
528	0.15721	248.62	0.35934	230.24	0.52695	211.85	0.10000	204.02
529	0.16303	227.54	0.35970	211.44	0.50091	194.31	0.10000	188.27
530	0.16816	214.86	0.37279	199.45	0.47416	182.73	0.10000	177.41
531	0.17001	213.91	0.40130	196.99	0.43720	179.75	0.10000	173.80
564	0.13580	393.49	0.47017	348.66	0.60814	319.17	0.10000	298.03
565	0.14408	351.51	0.43800	313.58	0.60807	287.25	0.10000	270.07
566	0.14998	311.73	0.40455	281.58	0.59615	258.25	0.10000	244.62
567	0.15485	276.72	0.37808	253.22	0.57660	232.54	0.10000	222.00
568	0.15956	247.71	0.36249	229.10	0.55650	210.50	0.10000	202.42
	0.16297			210.53				
569		225.98	0.35776		0.52554	193.42	0.10000	187.11
570	0.16459	213.24	0.36673	198.90	0.49042	182.52	0.10000	176.96
571	0.16172	213.02	0.39214	196.86	0.44065	180.39	0.10000	174.34
604	0.14354	402.37	0.50373	348.86	0.63982	318.52	0.10000	297.43
605	0.15135	357.21	0.46323	313.12	0.64248	286.05	0.10000	268.81
606	0.15618	314.69	0.42226	280.70	0.63216	256.76	0.10000	242.97
607	0.15933	277.45	0.38842	252.16	0.61153	231.03	0.10000	220.26
608	0.16184	246.89	0.36640	228.04	0.58849	209.20	0.10000	200.84
609	0.16235	224.23	0.35588	209.62	0.55227	192.54	0.10000	185.93
610	0.15998	211.31	0.35984	198.26	0.50801	182.27	0.10000	176.46
611	0.15212	211.90	0.38137	196.60	0.44425	181.00	0.10000	174.83
644	0.15304	412.90	0.54029	349.09	0.67375	317.85	0.10000	296.76
645	0.15986	363.94	0.49067	312.69	0.67929	284.82	0.10000	267.49
646	0.16303	318.14	0.44121	279.86	0.66980	255.27	0.10000	241.29
647	0.16410	278.40	0.39976	251.13	0.64821	229.52	0.10000	218.49
648	0.16404	246.06	0.37095	227.00	0.62226	207.89	0.10000	199.22
649	0.16125	222.30	0.35412	208.69	0.58061	191.63	0.10000	184.69
650	0.15451	209.10	0.35231	197.55	0.52670	181.99	0.10000	175.91
651	0.14142	210.57	0.36927	196.22	0.44795	181.57	0.10000	175.26
684	0.16419	424.95	0.57945	349.35	0.70959	317.17	0.10000	296.02
685	0.16960	371.57	0.52019	312.22	0.71851	283.53	0.10000	266.04
686	0.17039	321.87	0.46094	278.97	0.70851	253.71	0.10000	239.52
687	0.16901	279.39	0.41161	250.07	0.68556	227.97	0.10000	216.66
688	0.16611	245.15	0.37589	225.93	0.65672	206.55	0.10000	197.55
689	0.15975	220.20	0.35249	207.70	0.60957	190.68	0.10000	183.41
690	0.14842	206.69	0.34444	196.76	0.54582	181.67	0.10000	175.30
691	0.12997	209.08	0.35622	195.74	0.45168	182.11	0.10000	175.64
724	0.17659	438.31	0.62029	349.74	0.74628	316.60	0.10000	295.34
725	0.18056	380.40	0.55222	311.92	0.76023	282.32	0.10000	264.63
726	0.17865	326.38	0.48292	278.21	0.75055	252.21	0.10000	237.74
727	0.17424	280.67	0.42460	249.09	0.72507	226.46	0.10000	214.82
728	0.16811	244.29	0.38137	224.90	0.69239	205.24	0.10000	195.89
729	0.15794	218.02	0.35102	206.72	0.63893	189.74	0.10000	182.13
730	0.14201	204.18	0.33653	195.93	0.56477	181.32	0.10000	174.67
731	0.11839	207.53	0.34296	195.20	0.45528	182.59	0.10000	175.97
764	0.19007	452.93	0.66265	350.33	0.78345	316.21	0.10000	294.79
765	0.18988	388.33	0.57906	311.95	0.79411	281.60	0.10000	263.69
766	0.18683	331.41	0.50492	277.82	0.79089	251.08	0.10000	236.30
767	0.18052	282.74	0.44090	248.25	0.77194	224.95	0.10000	212.91
768	0.17043	243.60	0.38857	223.93	0.73465	203.90	0.10000	194.12
769	0.15575	215.64	0.34974	205.71	0.67245	188.76	0.10000	180.75
770	0.13493	201.42	0.32802	195.04	0.58550	180.94	0.10000	173.98
771	0.10599	205.83	0.32871	194.58	0.45898	183.05	0.10000	176.26

```
TOTAL NUMBER OF DESIGN VARIABLES = 27
TOTAL NUMBER OF CONSTRAINS = 1062
TOTAL NUMBER OF TEMP. CONSTRAINS = 396
TOTAL NUMBER OF TEMP. PRINTOUTS = 11
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.6838E+03
  1.0 A
                  Α
                                          Α
                  C
                              C
  0.0 +------
  -1.0 +
           .20 .30 .40 .50 .60 .70 TIME ( X 1.401E-44 )
                                                                                    .80 .90 1.00 1.10
      .10
MAXIMUM TEMPERATURE OF EVEN.
LAYER: 1 2 3 4
Tmax: 2300.33 350.33 800.33 300.33
Optv: 683.79 323.75 322.17 297.61
              MAXIMUM TEMPERATURE OF EVERY LAYER
                  VALUES OF DESIGN VARIABLES :
 VALUES OF DESIGN VARIABLES:

AYER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09

1 0.25962 0.14541 0.15421 0.46935 0.38882 0.35891 0.29578 0.37768 0.22798

2 0.85539 0.36679 0.31244 0.63331 0.39891 0.30137 0.60128 0.55816 0.30178

3 0.60571 0.43798 0.40000 0.47894 0.44026 0.40182 0.48369 0.44099 0.40237
LAYER
THE ORIGINAL OBJECTIVE FUNCTION = 5818.9228516
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5389165
THE TOTAL OPTIMAL WEIGHT = 9.55097023E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1720E+01
  1.0 +
                                                                                                       AA AA AA AAA AA A AAAAAA
                                                                                                       A A AA
                                                                                                                  A AA AA A AA
                                                                                                       A AA A AAAA AA A A
                         AAAAA
      AA A AAA A A A AA
  -1.0 +
            .10 .20 .30 .40 .50 .60 TIME ( X 4.064E-43 )
                                                                                    .70 .80 .90 1.00
      .00
 OPTIMAL STRUCTURES OF TPS FOR PATCH = 2
(WITH AVERAGE THICKNESS)
                      HRSI COAT
                                          slab
                                                               0.29753 in. 683.8 F
         0.12000 in. ALUMINUM 7075-T6
 _____
   i i i__ 0.09500 in.
i i i ALUMINUM 7075-T6
i i i i honey
i i i i cell = 0.30000 in.
 i
                                          honey comb 0.48105 in. 323.8 F
          0.11000 in. ALUMINUM 7075-T6
```

```
0.08000 in. INCONEL 617
v v v v 12000 in. i
v v v v v TITANIUM (6AL-4V) i
v v v v v v corrugated 0.45464 in. 322.2 F
v v v v v i
v v v pitch = 0.80000 in. i
      0.08000 in. INCONEL 617
_____
                                           slab
                      ALUMINUM 2024-T4
                                                                0.10000 in. 297.6 F
_____
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                              LAYER02
 PANEL LAYER01
                                                   LAYER03
                                                                       LAYER04
                     552.90
                                                              305.13
          0.25962
                              0.85539
                                          350.33
                                                   0.60571
                                                                       0.10000
                                                                                   290.60
    885
         0.22139
                    468.08 0.70083
                                         325.29
302.18
                                                   0.55454
                                                              288.28
                                                                       0.10000
                                                                                  276.00
                     394.10
                                                   0.50932
                                                              272.19
    887
          0 16366
                     331.40
                              0.45474
                                          280.97
                                                   0.47024
                                                              256.76
                                                                       0 10000
                                                                                   248 23
    888
          0.14541
                     281.34
                              0.36679
                                          261.78
                                                   0.43798
                                                              241.95
                                                                       0.10000
                                                                                   234.91
    889
          0.13609
                     246.74
                              0.30852
                                          245.14
                                                   0.41410
                                                              227.99
                                                                       0.10000
                                                                                   222.09
    890
          0.13783
                     230.88
                              0.28638
                                          231.38
                                                   0.40030
                                                              214.82
                                                                       0.10000
                                                                                   209.67
                                          221.57
                                                   0.40000
    924
          0.31050
                     583.19
                              0.81191
                                          350.22
                                                   0.57988
                                                              300.59
                                                                       0.10000
                                                                                   287.59
                     479.35
                              0.68561
                                                   0.54646
                                                               285.79
    925
          0.24333
                                          325.85
                                                                       0.10000
                                                                                   274.05
    926
          0.20614
                     401.56
                              0.55796
                                          303.11
                                                   0.50533
                                                              269.99
                                                                       0.10000
                                                                                   260.04
                                                   0.46746
    927
          0.19100
                              0.44579
                                          283.48
                                                              253.14
                                                                       0.10000
                     342.36
                                                                                   244.99
          0.19176
                     298.56
                              0.35999
                                          267.58
                                                   0.43815
                                                              236.17
                                                                       0.10000
    928
    929
          0.16337
                     256.16
                              0.30692
                                          249.16
                                                   0.41571
                                                              224.99
                                                                       0.10000
                                                                                   219.26
          0.15847
                     238.08
                                          234.78
                                                   0.40168
                                                              213.21
    931
          0 19940
                     257 05
                              0 31043
                                          229 36
                                                   0 40029
                                                              201 48
                                                                       0 10000
                                                                                   196 82
                     610.13
          0.35523
                              0.77179
                                          350.16
                                                   0.55627
                                                              296.84
                                                                       0.10000
                                                                                   285.08
    964
    965
          0 28999
                     504.02
                              0 65511
                                          327.35
                                                   0 52974
                                                              280 76
                                                                       0 10000
                                                                                   270 11
    966
          0.25442
                     424.03
                              0.53608
                                          306.25
                                                   0.49495
                                                              264.07
                                                                       0.10000
                                                                                   254.99
    967
          0 24086
                     362.90
                              0 43288
                                          288.30
                                                   0.46293
                                                              246.68
                                                                       0 10000
                                                                                   239.18
    968
          0.23887
                     316.16
273.02
                              0.35619
                                          273.46
                                                   0.43845
                                                              230.19
                                                                       0.10000
                                                                                   224.00
                                                               219.71
    969
          0.21143
                              0.30645
                                          256.30
                                                   0.41873
                                                                       0.10000
                                                                                   214.29
    970
          0.20350
                     253.84
                              0.28676
                                          242.23
                                                   0.40473
                                                              209.68
                                                                       0.10000
                                                                                  204.86
    971
          0.24123
                     272.80
                              0.30850
                                          236.61
                                                   0.40058
                                                              200.27
                                                                       0.10000
                                                                                   195.87
   1004
          0.39301
                     633.24
                              0.73552
                                          350.15
                                                   0.53520
                                                              293.95
                                                                       0.10000
                                                                                   283.13
   1005
                              0.62792
                                                              276.35
                                                                       0.10000
          0.33190
                     526.30
                                          328.81
                                                   0.51441
                                                                                   266.60
   1006
          0.29846
                     444.55
                              0.51800
                                          309.23
                                                   0.48550
                                                              258.70
                                                                       0.10000
                                                                                   250.35
   1007
          0 28535
                     381 25
                              0 42460
                                          292 65
                                                   0 45903
                                                              240 85
                                                                       0 10000
                                                                                   233 89
   1008
          0.28008
                     331.59
                              0.35635
                                          278.56
                                                   0.43878
                                                              224.81
                                                                       0.10000
   1009
          0 25373
                     287.92
                              0.30889
                                          262.50
                                                   0 42141
                                                              214 89
                                                                       0 10000
                                                                                   209 77
   1010
          0.24406
                     268.09
                              0.28883
                                          248.88
                                                   0.40753
                                                              206.39
                                                                       0.10000
                                                                                   201.81
   1011
          0 27611
                     285.97
                              0 30681
                                          242 70
                                                   0 40084
                                                              199 31
                                                                       0 10000
                                                                                   195 14
          0.42333
                     652.18
                                                              291.95
   1044
                              0.70341
                                          350.17
                                                   0.51688
                                                                       0.10000
                                                                                   281.75
   1045
          0.36782
                     545.53
                              0.60470
                                          330.16
                                                   0.50082
                                                              272.71
                                                                       0.10000
   1046
          0.33609
                     462.12
                              0.50461
                                          311.87
                                                   0.47739
                                                              254.11
                                                                       0.10000
                                                                                   246.32
   1047
          0.32189
                     396.35
                              0.42120
                                          296.27
                                                   0.45592
                                                              235.98
                                                                       0.10000
                                                                                   229.44
   1048
          0 31333
                     344.10
                              0 36003
                                          282.62
                                                   0 43910
                                                              220 32
                                                                       0 10000
                                                                                   214 83
                     300.30
                                          267.53
                                                              210.74
          0.28865
                              0.31390
                                                   0.42366
                                                                       0.10000
   1049
                                                                                   205.89
   1050
          0.27873
                     280.33
                              0.29236
                                          254.51
                                                   0.40997
                                                              203.45
                                                                       0.10000
                                                                                   199.10
                                          247.77
   1051
          0.30482
                     296.86
                              0.30532
                                                   0.40108
                                                              198.58
                                                                       0.10000
                                                                                   194.60
   1084
          0.44602
                              0.67569
                                          350.21
                                                   0.50140
                                                               290.86
                                                                       0.10000
   1085
          0.39711
                     561.39
                              0.58583
                                          331.38
                                                   0.48918
                                                              269.89
                                                                       0.10000
                                                                                   261.23
                     476.32
   1086
          0.36632
                              0.49609
                                          314.10
                                                   0.47082
                                                              250.45
                                                                       0.10000
                                                                                   243.03
   1087
          0 35019
                     408.16
                              0.42196
                                          299.11
                                                   0.45359
                                                              232.14
                                                                       0.10000
                                                                                   225.90
                                          285.75
                                                              216.68
                                                                       0.10000
                                                                                   211.45
          0.33927
                     354.00
                              0.36646
                                                   0.43941
   1088
   1089
          0.31674
                     310.41
                              0.32105
                                          271.49
                                                   0.42553
                                                              207.23
                                                                       0.10000
   1090
          0.30722
                     290.46
                              0.29723
                                          259.09
                                                   0.41207
                                                                       0.10000
                                                                                   196.76
          0.32736
                              0.30404
                                          251.81
                                                   0.40129
                                                              198.08
                                                                       0.10000
   1091
   1124
          0 46122
                     677 33
                              0 65235
                                          350 27
                                                   0 48878
                                                              290 64
                                                                       0 10000
                                                                                   280 73
                     573.68
   1125
                              0.57143
                                          332.44
                                                   0.47960
                                                                       0.10000
                                                                                   259.47
                     487.31
417.27
                              0.49191
0.42582
                                          315.92
301.32
                                                              247.70
229.21
   1126
          0.38944
                                                   0.46569
                                                                       0.10000
                                                                                   240.48
                                                                                   223.16
   1127
          0.37161
                                                   0.45189
                                                                       0.10000
   1128
          0.35950
                     361.92
                              0.37502
                                          288.16
                                                   0.43971
                                                              213.74
                                                                       0.10000
                                                                                   208.72
   1129
          0.33915
                     318.64
                              0.33004
                                          274.58
                                                   0.42707
                                                              204.27
                                                                       0.10000
                                                                                   199.90
                                          262.68
                                                   0.41385
   1130
          0.32983
                                                                       0.10000
   1131
          0.34371
                     311.76
                              0.30296
                                          254.82
                                                   0.40149
                                                              197.81
                                                                       0.10000
                                                                                   194.10
   1164
          0.46935
                     683.79
                              0.63331
                                          350.33
                                                   0.47894
                                                               291.21
                                                                       0.10000
                                                                                   281.01
   1165
          0.43473
                     582.40
                              0.56145
                                          333.32
                                                   0.47213
                                                              266.85
                                                                       0.10000
                                                                                   258.33
   1166
          0.40679
                     495.71
                              0.49129
                                          317.42
                                                   0.46171
                                                              245.68
                                                                       0.10000
                                                                                   238.53
   1167
          0.38848
                     424.60
                              0.43229
                                          303.10
                                                   0.45059
                                                               226.85
                                                                       0.10000
                                                                                   220.92
   1168
          0.37579
                     368.47
                              0.38573
                                          290.07
                                                   0.44000
                                                              211.24
                                                                       0.10000
                                                                                   206.40
          0.35723
                                          276.97
                                                   0.42837
   1170
          0 34737
                     305 01
                              0 31087
                                          265 38
                                                   0 41535
                                                              196 81
                                                                       0 10000
                                                                                   193 07
          0.35421
                     315.91
                                                   0.40166
                                                                       0.10000
   1171
                              0.30207
                                          256.86
                                                              197.75
                                                                                   194.12
   1204
          0 47086
                     683.79
                              0.61686
                                          350.32
                                                   0.47115
                                                              292.48
                                                                       0.10000
                                                                                   281 71
                              0.55653
                                                   0.46775
                                                              266.55
                                                                       0.10000
   1205
          0.44215
                     586.90
                                          333.90
                                                                                   257.86
   1206
          0 41907
                     501.78
                              0.49369
                                          318.61
                                                   0.45871
                                                              244.31
                                                                       0.10000
                                                                                   237.10
   1207
          0.40181
                     430.51
                              0.44149
                                          304.55
                                                   0.44960
                                                              224.90
                                                                       0.10000
                                                                                   219.03
                              0.39893
   1208
          0.38882
                     373.88
                                          291.53
                                                   0.44027
                                                               209.06
                                                                        0.10000
                                                                                   204.37
   1209
          0.37151
                     331.01
                              0.35415
                                          278.72
                                                   0.42943
                                                              199.35
                                                                       0.10000
                                                                                   195.42
                                          267.23
          0.36009
                     309.79
317.90
                              0.31990
                                                               195.15
                                                                       0.10000
   1210
                                                   0.41659
                                                                                   191.60
   1211
          0.35891
                              0.30137
                                          257.94
                                                   0.40182
                                                              197.92
                                                                       0.10000
                                                                                   194.33
          0.46548
                     683.79
                                          350.32
   1244
                              0.60388
                                                   0.46573
                                                              294.58
                                                                       0.10000
                                                                                   282.93
          0.44703
                     589.66
                                                   0.46280
                                                                        0.10000
   1246
          0.42713
                     505.32
                              0.49881
                                          319.48
                                                   0.45638
                                                              243.25
                                                                       0.10000
                                                                                  235.88
```

```
1247
           0.41166
                       434.45
                                 0.45369
                                             305.55
                                                       0.44882
                                                                   223.14
                                                                            0.10000
                                                                                         217.28
    1248
           0.39861
                        377.69
                                 0.41499
                                             292.42
                                                       0.44043
                                                                   207.02
                                                                             0.10000
                                                                                         202.46
    1249
           0 38185
                       335.06
                                 0.36963
                                             279 72
                                                       0 43018
                                                                   197.24
                                                                             0 10000
                                                                                         193 54
    1250
           0.36783
                        312.84
                                 0.33041
                                             268.14
                                                       0.41747
                                                                   194.33
                                                                             0.10000
                                                                                         190.81
                                 0.30084
                                                                   198.31
297.94
    1251
           0.35761
                       317.69
                                             258.03
                                                       0.40196
                                                                             0.10000
                                                                                         194.74
                                             350.31
                                                       0.46262
    1284
           0.45096
                       678.17
                                 0.59363
                                                                             0.10000
                                                                                         284.94
    1285
            0.44409
                        588.30
                                 0.55255
                                              334.88
                                                       0.45965
                                                                   267.65
                                                                             0.10000
    1286
           0.43066
                       506.51
                                 0.50983
                                             320.18
                                                       0.45470
                                                                   242.68
                                                                             0.10000
                                                                                         234.91
    1287
            0.41783
                        436.72
                                 0.47207
                                             306.20
                                                       0.44839
                                                                   221.65
                                                                             0.10000
    1288
           0.40487
                       380.20
                                 0.43618
                                             292.77
                                                       0.44059
                                                                   205.17
                                                                             0.10000
                                                                                         200.74
                                             279.94
                                                                   195.24
           0.38826
                        337.78
                                 0.38971
                                                       0.43067
                                                                             0.10000
                                                                                         191.78
    1289
    1290
            0.37019
                       314.10
                                 0.34395
                                             268.01
                                                       0.41806
                                                                   194.33
                                                                             0.10000
                                                                                         190.81
    1291
           0.34876
                        314.71
                                 0.30050
                                             256.91
                                                       0.40209
                                                                   199.04
                                                                             0.10000
                                                                                         195.43
            0.42090
                        663.23
                                 0.58749
                                              350.31
                                                       0.46316
                                                                   303.49
                                                                             0.10000
    1324
    1325
           0.42848
                       580.31
                                 0.56042
                                             335.10
                                                       0.45923
                                                                   270.37
                                                                            0.10000
                                                                                         259.02
                                 0.53029
                        503.13
                                             320.44
                                                       0.45460
                                                                   243.18
                                                                             0.10000
    1326
            0.42483
                                                                                         234.66
    1327
           0.41723
                        436.07
                                 0.50031
                                             306.20
                                                       0.44858
                                                                   220.74
                                                                            0.10000
                                                                                         214.55
    1328
           0.40569
                                             292.25
                                                       0.44075
                                                                   203.58
                       380.73
                                 0.46655
                                                                            0.10000
                                                                                         199.25
    1329
           0.38847
                        338.50
                                 0.41803
                                             278.95
                                                       0.43080
                                                                   194.33
                                                                             0.10000
                                                                                         190.81
    1330
           0.36388
                       312.49
                                 0.36294
                                             266.23
                                                       0.41823
                                                                   194.33
                                                                            0.10000
                                                                                         190.81
    1331
            0.32723
                                 0.30042
                                                       0.40222
                                                                   200.32
                                              253.76
                                                                             0.10000
    1364
           0.38168
                       642.90
                                 0.58810
                                             350.32
                                                       0.46787
                                                                   309.94
                                                                            0.10000
                                                                                         292.28
    1365
            0.40275
                        566.97
                                 0.57466
                                             335.03
                                                       0.46211
                                                                             0.10000
                                                                                         261.19
    1366
           0 40984
                       495.44
                                 0.55554
                                             320.13
                                                       0.45638
                                                                   244.79
                                                                            0.10000
                                                                                         235 32
    1367
           0.40892
                       432.21
                                 0.53151
                                             305.45
                                                       0.44945
                                                                   220.79
                                                                            0.10000
                                                                                         214.24
    1368
            0.39990
                       378.80
                                 0.49846
                                             290.89
                                                       0.44086
                                                                   202.77
                                                                             0.10000
    1369
           0.38140
                       336.70
                                 0.44741
                                             276.82
                                                       0.43047
                                                                   194.33
                                                                            0.10000
                                                                                         190.81
                        308.04
                                 0.38259
                                             263.05
                                                       0.41787
    1370
            0.34935
                                                                   194.33
    1371
           0.29729
                       296.37
                                 0.30068
                                             249.18
                                                       0.40230
                                                                   201.88
                                                                            0.10000
                                                                                         198.03
           0.34225
                        622.05
                                 0.59282
                                             350.32
                                                       0.47451
                                                                             0.10000
    1404
                                                                   316.04
                                                                                         296.04
    1405
           0.37420
                       552.07
                                 0.59094
                                             334.76
                                                       0.46667
                                                                   278.26
                                                                            0.10000
                                                                                         263.58
                                                       0.45907
           0.39117
                       486.09
                                 0.58031
    1406
                                             319.50
                                                                   246.86
                                                                            0.10000
                                                                                         236.46
    1407
            0.39694
                        426.88
                                 0.56025
                                             304.34
                                                       0.45063
                                                                   221.42
                                                                             0.10000
                                                                                         214.50
    1408
           0.39079
                       375.61
                                 0.52697
                                             289.19
                                                       0.44093
                                                                   202.57
                                                                            0.10000
                                                                                         198.29
                                             274.30
    1409
            0.37076
                        333.58
                                 0.47351
                                                       0.42990
                                                                   194.33
                                                                             0.10000
                                 0.40009
0.30112
                                             259.45
244.30
    1410
           0 33171
                       302.43
                                                       0 41723
                                                                   194.33
                                                                            0.10000
                                                                                         190 81
                        285.06
                                                       0.40235
                                                                   203.41
    1411
           0.26600
                                                                             0.10000
                                                                                         199.39
    1444
           0 29578
                       597.19
                                 0.60128
                                             350.33
                                                       0.48369
                                                                   322.96
                                                                             0.10000
                                                                                         300 33
    1445
           0.33853
                       533.40
                                 0.61156
                                             334.33
                                                       0.47324
                                                                   283.14
                                                                             0.10000
                                                                                         266.57
    1446
           0.36656
                       473.88
                                 0.60912
                                             318.52
                                                       0.46291
                                                                   249.64
                                                                             0.10000
                                                                                         238.15
    1447
           0.38020
                        419.54
                                 0.59237
                                             302.77
                                                       0.45223
                                                                   222.60
                                                                             0.10000
                                                                                         215.22
                        370.96
                                                                   202.78
    1448
            0.37768
                                 0.55816
                                             286.95
                                                       0.44099
                                                                             0.10000
                                                                                         198.47
    1449
           0.35568
                       328.98
                                 0.50200
                                             271.04
254.90
                                                       0.42907
0.41629
                                                                   194.33
                                                                            0.10000
                                                                                         190.81
           0.30869
                        294.99
                                 0.41929
                                                                   194.33
                                                                             0.10000
    1450
                                                                                         190.81
    1451
           0.22798
                       271.26
                                 0.30178
                                             238.31
                                                       0.40237
                                                                   205.19
                                                                            0.10000
                                                                                         200.96
                     OPTIMIZATION SYSTEM FOR TPSSYM =
 TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 2064
TOTAL NUMBER OF TEMP. CONSTRAINS = 594
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  х 0
1.0 в
        0.2955E+03
                   В
                                В
                                              В
                    F
                                 F
                                                           D
                                                                        D
                                                                                     D
                                                                                                                В
                                                                                                                             В
                                                                                                   D
                                                                                                                D
                                                                                                                             D
  -1.0
       .10
                    .20
                                 .30
                                              .40
                                                           .50
                                                                        .60
                                                                                                  .80
                                                                                                                .90
                                                                                                                            1.00
                                                                                                                                       1.10
                                                                 TIME ( X 1.401E-44 )
               MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:
        1 2 3 4 5
2300.33 2020.33 1800.33 2020.33 550.33
                                                          300.33
Tmax:
Optv:
         295.54 295.54 232.49 232.49
                                               203.76
                                                          203.76
                     VALUES OF DESIGN VARIABLES :
                            DEV03
                   DEV02
                                      DEV04
                                                DEV05
                                                                    DEV07
         DEV01
                                                          DEV06
                                                                              DEV08
LAYER
                           0.05000
                                    0.05000
                                              0.05000
                                                                  0.05000
    1 0.05000
2 0.08000
       0.05000
                0.05000
                                                        0.05000
                                                                            0.05000
                                                                                     0.05000
                 0.08000
                          0.08000
                                    0.08000
                                              0.08000
                                                        0.08000
                                                                            0.08000
                                                                                     0.08000
       1.00000 1.00000 1.00000 1.00000 1.00000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
```

1.00000 0.05000

0.05000

0.05000

```
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006
THE TOTAL OPTIMAL WEIGHT = 6.25791764E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
       0.5028E+00
  1.0 A
                      1.20 1.30 1.40 1.50 1.60 TIME ( X 0.000E+00 )
               1.10
                                                                          1.60
                                                                                                          1.90
      1.00
                                                                                    1.70 1.80
                                                                                                                      2.00
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
(WITH AVERAGE THICKNESS)
                    HRSI COAT thin skin
                                                            0.05000 in. 295.5 F
 ______
                                                            ----
                     AB312 Fabric
                                        slab
                                                            0.08000 in. 295.5 F
                                                            i
_____
                     O-Felt(3.5 PCF) thin skin
                                                            1.00001 in. 232.5 F
______
                                                              i
                     AB312 Fabric
                                         slab
                                                            0.05000 in. 232.5 F
                     RTV-560
                                        thin skin
                                                            0.05000 in. 203.8 F
 ----
                     ALUMINUM 2024-T4
                                                            0.15000 in. 203.8 F
                                        slab
_____
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                            3
  PANEL
          LAYER01
                            LAYER02
                                                LAYER03
                                                                  LAYER04
                                                                                      LAYER05
                                                                                                         LAYER06
                                                                             175.30
          0.05000
                    237.06 0.08000
                                       237.06
                                                1.00000
                                                                  0.05000
                                                                                      0.05000
                                                                                                         0.15000
                   236.18 0.08000
235.48 0.08000
                                       236.18
235.48
                                                          205.83
                                                                             175.48
175.65
                                                                                                163.86
164.24
                                                                                                                   152.24
152.82
     18
          0.05000
                                              1.00000
                                                                  0.05000
                                                                                      0.05000
                                                                                                         0.15000
          0.05000
                                                1.00000
                                                                                      0.05000
     19
                                                                  0.05000
                                                                                                         0.15000
          0.05000
                    234.73
                            0.08000
                                       234.73
                                                1.00000
                                                          205.29
                                                                   0.05000
                                                                             175.86
                                                                                      0.05000
                                                                                                164.67
                                                                                                         0.15000
                                                          205.04
     21
          0.05000
                    233.91
                            0.08000
                                       233.91
                                                1.00000
                                                                  0.05000
                                                                             176.18
                                                                                     0.05000
                                                                                                165.25
                                                                                                         0.15000
                                                                                                                   154.32
     22
          0.05000
                    233.20
                             0.08000
                                       233.20
                                                1.00000
                                                          204.90
                                                                   0.05000
                                                                                      0.05000
                                                                                                165.92
                                                                                                         0.15000
                                                                                                                   155.24
     23
          0.05000
                    232 76
                            0 08000
                                       232 76
                                                1 00000
                                                          204 94
                                                                  0.05000
                                                                             177.12
                                                                                      0.05000
                                                                                                166 66
                                                                                                         0 15000
                                                                                                                   156 20
                    232.55
                                       232.55
                                                                             177.63
          0.05000
                             0.08000
                                                1.00000
                                                          205.09
                                                                   0.05000
                                                                                      0.05000
                                                                                                167.33
                                                                                                         0.15000
                    232.55
232.67
                            0.08000
                                       232.51
232.67
                                                1.00000
                                                          205.33
205.79
                                                                  0.05000
0.05000
                                                                             178.15
178.92
                                                                                      0.05000
0.05000
     25
          0.05000
                                                                                                167.98
                                                                                                         0.15000
                                                                                                                   157.81
                                                                                                         0.15000
          0.05000
     26
                                                                                                168.88
                                                                                                                   158.85
     27
          0.05000
                    233.12
                             0.08000
                                       233.12
                                                1.00000
                                                          206.48
                                                                  0.05000
                                                                             179.85
                                                                                      0.05000
                                                                                                169.92
                                                                                                         0.15000
                                                                                                                   159.99
     28
          0.05000
                    233.67
                             0.08000
                                       233.67
                                                1.00000
                                                          207.16
                                                                  0.05000
                                                                             180.64
                                                                                      0.05000
                                                                                                170.76
                                                                                                         0.15000
                                                                                                                   160.89
          0.05000
                    234.28
                             0.08000
                                       234.28
                                                1.00000
                                                           207.82
                                                                   0.05000
                                                                                      0.05000
                                                                                                171.50
                                                                                                         0.15000
     29
                                                                             181.36
                                                                                                                   161.64
     57
          0.05000
                    237.61
                             0.08000
                                       237.61
                                                1.00000
                                                          208.67
                                                                  0.05000
                                                                             179.73
                                                                                      0.05000
                                                                                                168.93
                                                                                                         0.15000
                                                                                                                   158.12
     58
          0.05000
                    238.66
                             0.08000
                                       238.66
                                                1.00001
                                                          209.09
                                                                   0.05000
                                                                             179.52
                                                                                      0.05000
                                                                                                169.01
                                                                                                         0.15000
                                                                                                                   158.49
     59
          0.05000
                    239.32
                             0.08000
                                       239.32
                                                1.00002
                                                          209.29
                                                                  0.05000
                                                                             179.26
                                                                                      0.05000
                                                                                                168.95
                                                                                                         0.15000
                                                                                                                   158.64
                                                                                      0.05000
     60
          0.05000
                    239.78
                             0.08000
                                       239.78
                                                1.00002
                                                          209.42
                                                                   0.05000
                                                                             179.06
                                                                                                168.95
                                                                                                         0.15000
                                                                                                                   158.84
          0.05000
                    239.93
                             0.08000
                                       239.93
                                                1.00003
                                                          209.46
                                                                   0.05000
                                                                             178.99
                                                                                      0.05000
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THE ORIGINAL OBJECTIVE FUNCTION =

104	0.05000	243.95	0.08000	243.95	1.00004	213.01	0.05000	182.08	0.05000	172.92	0.15000	163.75
	0.05000	243.93	0.08000	244.01	1.00004	213.01	0.05000	182.81	0.05000	173.68	0.15000	164.56
105				244.01		213.41						
106	0.05000	245.15 246.22	0.08000		1.00003		0.05000	184.52	0.05000	175.48	0.15000	166.43
107	0.05000		0.08000	246.22	1.00002	216.49	0.05000	186.75		177.71	0.15000	168.68
108	0.05000	246.93	0.08000	246.93	1.00001	217.86	0.05000	188.79	0.05000	179.68	0.15000	170.58
109	0.05000	247.31	0.08000	247.31	1.00000	218.93	0.05000	190.56	0.05000	181.35	0.15000	172.14
137	0.05000	257.72	0.08000	257.72	1.00000	229.84	0.05000	201.95	0.05000	191.02	0.15000	180.08
138	0.05000	257.02	0.08000	257.02	1.00002	227.70	0.05000	198.39	0.05000	187.93	0.15000	177.46
139	0.05000	255.81	0.08000	255.81	1.00003	225.31	0.05000	194.82	0.05000	184.81	0.15000	174.81
140	0.05000	255.04	0.08000	255.04	1.00005	223.32	0.05000	191.60	0.05000	182.05	0.15000	172.49
141	0.05000	254.32	0.08000	254.32	1.00006	221.49	0.05000	188.66	0.05000	179.54	0.15000	170.42
142	0.05000	253.07	0.08001	253.07	1.00007	219.72	0.05000	186.37	0.05000	177.54	0.15000	168.72
143	0.05000	250.92	0.08001	250.92	1.00006	217.89	0.05000	184.85	0.05000	176.11	0.15000	167.36
144	0.05000	249.27	0.08000	249.27	1.00005	216.86	0.05000	184.45	0.05000	175.68	0.15000	166.90
145	0.05000	249.19	0.08000	249.19	1.00005	217.14	0.05000	185.09	0.05000	176.33	0.15000	167.57
146	0.05000	250.41	0.08000	250.41	1.00004	218.68	0.05000	186.95	0.05000	178.24	0.15000	169.53
147	0.05000	251.42	0.08000	251.42	1.00003	220.44	0.05000	189.46	0.05000	180.71	0.15000	171.96
148	0.05000	251.94	0.08000	251.94	1.00002	221.85	0.05000	191.77	0.05000	182.91	0.15000	174.05
149	0.05000	252.09	0.08000	252.09	1.00002	222.94	0.05000	193.79	0.05000	184.79	0.15000	175.79
177	0.05000	275.12	0.08000	275.12	1.00000	245.85	0.05000	216.58	0.05000	204.22	0.15000	191.87
178	0.05000	271.68	0.08000	271.68	1.00001	241.63	0.05000	211.58	0.05000	199.76	0.15000	187.95
179	0.05000	267.74	0.08000	267.74	1.00003	236.89	0.05000	206.05	0.05000	194.91	0.15000	183.78
180	0.05000	264.39	0.08000	264.39	1.00003	232.45	0.05000	200.03	0.05000	190.12	0.15000	179.73
181	0.05000	261.40	0.08000	261.40	1.00006	228.19	0.05000	194.97	0.05000	185.39	0.15000	175.81
182	0.05000	258.78	0.08001	258.78	1.00007	224.70	0.05000	190.62	0.05000	181.68	0.15000	172.74
183	0.05000	256.19	0.08001	256.19	1.00007	222.06	0.05000	187.93	0.05000	179.32	0.15000	170.70
184	0.05000	254.29	0.08001	254.29	1.00007	220.63	0.05000	186.97	0.05000	178.43	0.15000	169.89
185	0.05000	253.90	0.08000	253.90	1.00006	220.62	0.05000	187.33	0.05000	178.81	0.15000	170.29
186	0.05000	254.97	0.08000	254.97	1.00005	222.06	0.05000	189.14	0.05000	180.64	0.15000	172.14
187	0.05000	255.96	0.08000	255.96	1.00004	223.88	0.05000	191.80	0.05000	183.24	0.15000	174.67
188	0.05000	256.30	0.08000	256.30	1.00002	225.29	0.05000	194.28	0.05000	185.58	0.15000	176.88
189	0.05000	256.20	0.08000	256.20	1.00000	226.31	0.05000	196.42	0.05000	187.56	0.15000	178.70
217	0.05000	286.43	0.08000	286.43	1.00000	255.97	0.05000	225.51	0.05000	212.07	0.15000	198.63
218	0.05000	282.13	0.08000	282.13	1.00001	251.40	0.05000	220.66	0.05000	207.63	0.15000	194.60
219	0.05000	276.83	0.08000	276.83	1.00002	245.72	0.05000	214.61	0.05000	202.28	0.15000	189.96
220	0.05000	271.63	0.08000	271.63	1.00003	239.73	0.05000	207.83	0.05000	196.40	0.15000	184.98
221	0.05000	266.97	0.08000	266.97	1.00005	233.83	0.05000	200.69	0.05000	190.34	0.15000	179.99
222	0.05000	263.31	0.08001	263.31	1.00007	229.01	0.05000	194.71	0.05000	185.35	0.15000	175.99
223	0.05000	260.27	0.08001	260.27	1.00008	225.54	0.05000	190.81	0.05000	182.08	0.15000	173.34
224	0.05000	258.43	0.08001	258.43	1.00007	223.90	0.05000	189.38	0.05000	180.87	0.15000	172.37
225	0.05000	257.63	0.08001	257.63	1.00007	223.47	0.05000	189.31	0.05000	180.87	0.15000	172.43
226	0.05000	258.10	0.08000	258.10	1.00006	224.42	0.05000	190.74	0.05000	182.31	0.15000	173.89
227	0.05000	258.71	0.08000	258.71	1.00004	225.96	0.05000	193.21	0.05000	184.70	0.15000	176.19
228	0.05000	258.71	0.08000	258.71	1.00004	227.15	0.05000	195.56	0.05000	186.91	0.15000	178.25
229	0.05000	258.27	0.08000	258.27	1.00000	227.94	0.05000	197.62	0.05000	188.79	0.15000	179.97
257	0.05000	290.63	0.08000	290.63	1.00000	259.69	0.05000	228.75	0.05000	214.89	0.15000	201.02
258	0.05000	286.49	0.08000	286.49	1.00000	255.43	0.05000	224.38	0.05000	210.81	0.15000	197.24
259	0.05000	281.18	0.08000	281.18	1.00001	249.94	0.05000	218.71	0.05000	205.74	0.15000	192.77
260	0.05000	275.55	0.08000	275.55	1.00003	243.73	0.05000	211.91	0.05000	199.81	0.15000	187.70
261	0.05000	270.33	0.08000	270.33	1.00005	237.40	0.05000	204.46	0.05000	193.47	0.15000	182.48
262	0.05000	266.36	0.08001	266.36	1.00007	232.17	0.05000	197.98	0.05000	188.10	0.15000	178.23
263	0.05000	263.36	0.08001	263.36	1.00008	228.41	0.05000	193.46	0.05000	184.43	0.15000	175.40
264	0.05000	261.46	0.08001	261.46	1.00008	226.47	0.05000	191.47	0.05000	182.84	0.15000	174.20
265	0.05000	260.47	0.08001	260.47	1.00007	225.75	0.05000	191.02	0.05000	182.54	0.15000	174.05
266	0.05000	260.29	0.08000	260.29	1.00006	226.12	0.05000	191.95	0.05000	183.50	0.15000	175.06
267	0.05000	261.47	0.08000	261.47	1.00004	228.07	0.05000	194.68	0.05000	186.11	0.15000	177.55
268	0.05000	260.80	0.08000	260.80	1.00002	228.68	0.05000	196.56	0.05000	187.86	0.15000	179.17
269	0.05000	259.91	0.08000	259.91	1.00000	229.12	0.05000	198.33	0.05000	189.49	0.15000	180.64
297	0.05000	292.42	0.08000	292.42	1.00000	261.27	0.05000	230.12	0.05000	216.08	0.15000	202.03
298	0.05000	288.57	0.08000	288.57	1.00000	257.36	0.05000	226.16	0.05000	212.32	0.15000	198.48
299	0.05000	283.60	0.08000	283.60	1.00001	252.29	0.05000	220.99	0.05000	207.64	0.15000	194.30
300	0.05000	278.16	0.08000	278.16	1.00002	246.42	0.05000	214.68	0.05000	202.08	0.15000	189.49
301	0.05000	272.97	0.08000	272.97	1.00004	240.29	0.05000	207.61	0.05000	196.01	0.15000	184.42
302	0.05000	269.02	0.08000	269.02	1.00006	235.14	0.05000	201.26	0.05000	190.74	0.15000	180.22
303	0.05000	266.26	0.08001	266.26	1.00007	231.41	0.05000	196.56	0.05000	186.98	0.15000	177.40
304	0.05000	264.60	0.08001	264.60	1.00007	229.40	0.05000	194.19	0.05000	185.16	0.15000	176.14
305	0.05000	263.88	0.08001	263.88	1.00007	228.71	0.05000	193.55	0.05000	184.76	0.15000	175.98
306	0.05000	263.73	0.08000	263.73	1.00006	228.99	0.05000	194.24	0.05000	185.51	0.15000	176.77
307	0.05000	262.98	0.08000	262.98	1.00004	229.25	0.05000	195.51	0.05000	186.71	0.15000	177.91
308	0.05000	261.71	0.08000	261.71	1.00002	229.21	0.05000	196.71	0.05000	187.81	0.15000	178.92
309	0.05000	260.28	0.08000	260.28	1.00000	229.07	0.05000	197.87	0.05000	188.87	0.15000	179.86
337	0.05000	293.65	0.08000	293.65	1.00000	262.35	0.05000	231.06	0.05000	216.88	0.15000	202.71
338	0.05000	290.16	0.08000	290.16	1.00000	258.83	0.05000	227.50	0.05000	213.46	0.15000	199.41
339	0.05000	285.59	0.08000	285.59	1.00001	254.23	0.05000	222.87	0.05000	209.21	0.15000	195.55
340	0.05000	280.54	0.08000	280.54	1.00001	248.88	0.05000	217.23	0.05000	204.16	0.15000	191.09
341	0.05000	275.57	0.08000	275.57	1.00003	243.21	0.05000	210.85	0.05000	198.58	0.15000	186.31
342	0.05000	271.60	0.08000	271.60	1.00004	238.29	0.05000	204.97	0.05000	193.59	0.15000	182.20
343	0.05000	268.78	0.08000	268.78	1.00004	234.54	0.05000	200.30	0.05000	189.78	0.15000	179.26
344	0.05000	267.13	0.08001	267.13	1.00006	232.35	0.05000	197.56	0.05000	187.65	0.15000	177.75
344	0.05000	266.04	0.08001	266.04	1.00006	232.33	0.05000	196.18	0.05000	186.64	0.15000	177.09
345	0.05000	264.72	0.08001	264.72	1.00005	230.16	0.05000	195.10	0.05000	186.19	0.15000	176.77
347	0.05000	262.48	0.08000	262.48	1.00004	228.87	0.05000 0.05000	195.27	0.05000	185.86	0.15000	176.45
348	0.05000	260.12	0.08000	260.12	1.00002	227.58		195.05	0.05000	185.64	0.15000	176.23
349		257.80		257.80		226.37	0.05000	194.94 231.69	0.05000	185.53	0.15000	176.11
377	0.05000	294.48	0.08000	294.48	1.00000	263.08	0.05000		0.05000	217.43	0.15000	203.17
378	0.05000	291.29	0.08000	291.29	1.00000	259.88	0.05000	228.46	0.05000	214.27	0.15000	200.08
379	0.05000	287.10	0.08000	287.10	1.00000	255.69	0.05000	224.29	0.05000	210.38	0.15000	196.48
380	0.05000	282.45	0.08000	282.45	1.00001	250.86	0.05000	219.28	0.05000	205.82	0.15000	192.36
381	0.05000	277.72	0.08000	277.72	1.00002	245.69	0.05000	213.66	0.05000	200.77	0.15000	187.88
382	0.05000	273.62	0.08000	273.62	1.00003	240.99	0.05000	208.36	0.05000	196.08	0.15000	183.80
383	0.05000	270.25	0.08000	270.25	1.00004	237.01	0.05000	203.78	0.05000	192.13	0.15000	180.48
384	0 05000	267.88	0.08000	267.88	1.00004	234.25	0.05000	200.62	0.05000	189.46	0.15000	178.30
	0.05000											
385	0.05000	265.93	0.08000	265.93	1.00004	232.10	0.05000	198.27	0.05000	187.52	0.15000	176.77
386	0.05000 0.05000	265.93 263.02	0.08000	263.02	1.00004	229.47	0.05000	195.92	0.05000	185.42	0.15000	176.77 174.91
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                                                                  227.70
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                                                                                                                                 181.36
     464
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                                 0.08000
                                            241.60
                                                      1.00000
                                                                                       180.05
                                                                                                0.05000
                                                                                                            168.99
                                                                                                                     0.15000
                       241.60
                                                                  210.83
                                                                           0.05000
                     OPTIMIZATION SYSTEM FOR TPSSYM =
 TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 2462
 TOTAL NUMBER OF CONSTRAINS = 2462
TOTAL NUMBER OF TEMP. CONSTRAINS = 1122
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
        0.4069E+03
   1.0 B
                   В
                                В
                                             В
                   D
                                D
                                             D
       D
                                                                       В
                                                                                                             В
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   0.0
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                                                                                                             .90
       1.0
                                                          .50
                                                                                                .80
                                                                                                                          1 00
                                                                                                                                    1 10
                                                                TIME ( X 1.401E-44 )
               MAXIMUM TEMPERATURE OF EVERY LAYER
       1 2 3 4 5
2300.33 2020.33 1800.33 2020.33 550.33
LAYER:
Tmax:
         406.90
                  406.90 281.78 281.78
                                             250.88
                                                         250.88
                     VALUES OF DESIGN VARIABLES :
                           DEV03 DEV04
0.05000 0.05000
                                               DEV05
LAYER
         DEV01
                  DEV02
                                                         DEV06
                                                                  DEV07
                                                                            DEV08
                                                                                      DEV09
                          0.05000
                                             0.05000
       0.05000
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THE ORIGINAL OBJECTIVE FUNCTION =
                                         499.9669800
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006
 THE TOTAL OPTIMAL WEIGHT = 1.67899825E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.5576E+00
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Α

1.0 +

A

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0 0
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                                                             .58 .68
TIME ( X 1.401E-44 )
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                                                        .48
                                                                                             .78
                                                                                                          .88
                                                                                                                      . 98
                                                                                                                                1.08
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                     (WITH AVERAGE THICKNESS)
HRSI COAT thin skin
                                                                 0.05000 in.
                      AB312 Fabric
                                                                 0.08000 in.
                                                                                406.9 F
                                                                  i
---
Q-Felt(3.5 PCF) thin skin
                                                                 1.00000 in. 281.8 F
                                                                 ----
                      AB312 Fabric
                                                                 0.05000 in. 281.8 F
                                            slab
                                                                 0.05000 in.
                                                                                250.9 F
----
                      ALUMINUM 2024-T4
                                            slab
                                                                 0.15000 in.
                                                                               250.9 F
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
 PANEL
          LAYER01
                               LAYER02
                                                    LAYERO3
                                                                        LAYER04
                                                                                             LAYER05
                                                                                                                  LAYER06
                                                               321.27
                                                                                                         237.86
                     390.69
                              0.08000
                                          390.69
                                                                        0.05000
                                                                                    251.85
                                                                                             0.05000
                                                                                                                              223.87
    497
          0.05000
                                                    1.00000
                                                                                                                  0.15000
    498
          0.05000
                     376.57
                              0.08000
                                          376.57
                                                   1.00000
                                                               313.60
                                                                        0.05000
                                                                                    250.63
                                                                                             0.05000
                                                                                                         234.27
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                                                                                                                              217.92
    499
          0.05000
                     370.58
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                                          370 58
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                                                               305 16
                                                                        0.05000
                                                                                    239 73
                                                                                             0.05000
                                                                                                         224 80
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                                                                                                                              209 88
    500
          0.05000
                     360.42
                              0.08000
                                          360.42
                                                    1.00000
                                                               295.46
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                                                                                    230.50
                                                                                             0.05000
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                     346.60
331.35
                              0.08000
    501
          0.05000
                                          346.60
                                                    1.00000
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                                                                                    221.79
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                                          331.35
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                                                                                    212.92
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                                          290.47
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                                          256.19
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                                                               218.26
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          0.05000
                     383.84
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                                          383.84
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                                                               320.65
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          0.05000
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                              0.08000
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    539
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                               0.08000
                                          366.35
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                                                                                                                  0.15000
    627
          0.05000
                     257.46
                              0.08000
                                          257.46
                                                    1.00001
                                                               227.71
                                                                        0.05000
                                                                                    197.97
                                                                                             0.05000
                                                                                                         178.99
                                                                                                                  0.15000
                                                                                                                             160.01
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628	0.05000	240.87	0.08000	240.87	1.00000	212.75	0.05000	184.63	0.05000	168.65	0.15000	152.67
629	0.05000	230.88	0.08000	225.97	1.00000	199.19	0.05000	172.40	0.05000	159.41	0.15000	150.53
657	0.05000	372.93	0.08000	372.93	1.00000	321.37	0.05000	269.80	0.05000	249.51	0.15000	229.22
658	0.05000	367.29	0.08000	367.29	1.00000	320.12	0.05000	272.94	0.05000	249.84	0.15000	226.74
659	0.05000	362.53	0.08000	362.53	1.00001	316.85	0.05000	271.17	0.05000	246.81	0.15000	222.45
660	0.05000	356.09	0.08000	356.09	1.00001	312.12	0.05000	268.15	0.05000	242.62	0.15000	217.09
661	0.05000	347.45	0.08000	347.45	1.00002	306.18	0.05000	264.91	0.05000	238.14	0.15000	211.37
662	0.05000	337.55	0.08000	337.55	1.00002	299.13	0.05000	260.71	0.05000	233.22	0.15000	205.72
663	0.05000	326.78	0.08000	326.78	1.00002	290.67	0.05000	254.56	0.05000	227.15	0.15000	199.75
664	0.05000	316.65	0.08000	316.65	1.00002	282.12	0.05000	247.58	0.05000	220.88	0.15000	194.19
665	0.05000	305.84	0.08000	305.84	1.00002	272.52	0.05000	239.20	0.05000	213.69	0.15000	188.17
666	0.05000	290.18	0.08000	290.18	1.00002	258.16	0.05000	226.14	0.05000	202.95	0.15000	179.76
667	0.05000	272.10	0.08000	272.10	1.00001	241.05	0.05000	210.01	0.05000	190.23	0.15000	170.45
668	0.05000	257.67	0.08000	257.67	1.00001	227.10	0.05000	196.53	0.05000	179.88	0.15000	163.24
669	0.05000	245.07	0.08000	245.07	1.00000	214.61	0.05000	184.15	0.05000	170.65	0.15000	157.15
697	0.05000	371.81	0.08000	371.81	1.00000	322.36	0.05000	272.92	0.05000	251.69	0.15000	230.47
698	0.05000	367.68	0.08000	367.68	1.00000	321.59	0.05000	275.49	0.05000	251.94	0.15000	228.39
										249.50		
699	0.05000	363.17	0.08000	363.17	1.00001	318.74	0.05000	274.30	0.05000		0.15000	224.69
700	0.05000	357.46	0.08000	357.46	1.00001	315.04	0.05000	272.63	0.05000	246.57	0.15000	220.52
701	0.05000	350.27	0.08000	350.27	1.00002	310.37	0.05000	270.47	0.05000	243.35	0.15000	216.23
702	0.05000	342.39	0.08000	342.39	1.00002	304.70	0.05000	267.02	0.05000	239.56	0.15000	212.10
703	0.05000	334.01	0.08000	334.01	1.00002	297.88	0.05000	261.75	0.05000	234.70	0.15000	207.66
704	0.05000	326.32	0.08000	326.32	1.00002	291.05	0.05000	255.79	0.05000	229.64	0.15000	203.48
705	0.05000	317.78	0.08000	317.78	1.00002	283.13	0.05000	248.48	0.05000	223.51	0.15000	198.53
706	0.05000	305.74	0.08000	305.74	1.00001	271.42	0.05000	237.10	0.05000	214.37	0.15000	191.64
707	0.05000	292.28	0.08000	292.28	1.00001	257.67	0.05000	223.07	0.05000	203.55	0.15000	184.03
708	0.05000	281.77	0.08000	281.77	1.00000	246.57	0.05000	211.38	0.05000	194.74	0.15000	178.10
709	0.05000	273.54	0.08000	273.54	1.00000	237.36	0.05000	201.19	0.05000	187.33	0.15000	173.47
737	0.05000	371.94	0.08000	371.94	1.00000	323.80	0.05000	275.66	0.05000	253.71	0.15000	231.76
738	0.05000	368.90	0.08000	368.90	1.00000	323.28	0.05000	277.66	0.05000	253.92	0.15000	230.18
739	0.05000	364.74	0.08000	364.74	1.00001	320.93	0.05000	277.11	0.05000	252.24	0.15000	227.38
740	0.05000	359.94	0.08000	359.94	1.00001	318.06	0.05000	276.19	0.05000	250.31	0.15000	224.44
741	0.05000	354.32	0.08000	354.32	1.00001	314.38	0.05000	274.44	0.05000	248.02	0.15000	221.59
742	0.05000	348.51	0.08000	348.51	1.00002	309.93	0.05000	271.34	0.05000	245.14	0.15000	218.94
743	0.05000	342.61	0.08000	342.61	1.00002	304.74	0.05000	266.87	0.05000	241.46	0.15000	216.04
744	0.05000	337.51	0.08000	337.51	1.00002	299.78	0.05000	262.06	0.05000	237.69	0.15000	213.32
745	0.05000	332.05	0.08000	332.05	1.00001	294.25	0.05000	256.44	0.05000	233.24	0.15000	210.04
746	0.05000	324.89	0.08000	324.89	1.00001	286.37	0.05000	247.86	0.05000	226.68	0.15000	205.51
747	0.05000	317.53	0.08000	317.53	1.00001	277.50	0.05000	237.47	0.05000	218.99	0.15000	200.51
748	0.05000	312.24	0.08000	312.24	1.00000	270.63	0.05000	229.03	0.05000	212.84	0.15000	196.66
749	0.05000	309.62	0.08000	309.62	1.00000	266.08	0.05000	222.55	0.05000	208.44	0.15000	194.32
777	0.05000	373.54	0.08000	373.54	1.00000	325.79	0.05000	278.04	0.05000	255.59	0.15000	233.13
778	0.05000	370.99	0.08000	370.99	1.00000	325.10	0.05000	279.21	0.05000	255.60	0.15000	232.00
779	0.05000	367.20	0.08000	367.20	1.00001	323.10	0.05000	278.88	0.05000	254.47	0.15000	230.06
780	0.05000	363.26	0.08000	363.26	1.00001	320.68	0.05000	278.11	0.05000	253.18	0.15000	228.26
781	0.05000	359.05	0.08000	359.05	1.00001	317.71	0.05000	276.38	0.05000	251.56	0.15000	226.74
782	0.05000	355.09	0.08000	355.09	1.00001	314.32	0.05000	273.56	0.05000	249.51	0.15000	225.47
783	0.05000	351.53	0.08000	351.53	1.00001	310.75	0.05000	269.98	0.05000	247.03	0.15000	224.08
784	0.05000	348.94	0.08000	348.94	1.00001	307.70	0.05000	266.46	0.05000	244.63	0.15000	222.81
785	0.05000	346.47	0.08000	346.47	1.00001	304.55	0.05000	262.63	0.05000	241.89	0.15000	221.15
786	0.05000	344.05	0.08000	344.05	1.00001	300.57	0.05000	257.09	0.05000	238.03	0.15000	218.96
787	0.05000	342.62	0.08000	342.62	1.00001	296.71	0.05000	250.79	0.05000	233.70	0.15000	216.62
788	0.05000	342.37	0.08000	342.37	1.00000	294.16	0.05000	245.95	0.05000	230.42	0.15000	214.89
789	0.05000	344.94	0.08000	344.94	1.00000	294.13	0.05000	243.31	0.05000	229.07	0.15000	214.82
817	0.05000	376.73	0.08000	376.73	1.00000	328.31	0.05000	279.88	0.05000	257.20	0.15000	234.52
818	0.05000	374.01	0.08000	374.01	1.00000	327.05	0.05000	280.09	0.05000	256.97	0.15000	233.85
819	0.05000	370.52	0.08000	370.52	1.00001	325.06	0.05000	279.60	0.05000	256.17	0.15000	232.75
820	0.05000	367.26	0.08000	367.26	1.00001	322.93	0.05000	278.60	0.05000	255.27	0.15000	231.94
821	0.05000	364.10	0.08000	364.10	1.00001	320.40	0.05000	276.71	0.05000	254.12	0.15000	231.52
		361.60								252.82		
822	0.05000		0.08000	361.60	1.00001	317.91	0.05000	274.22	0.05000		0.15000	231.42
823	0.05000	359.99	0.08000	359.99	1.00001	315.79	0.05000	271.60	0.05000	251.45	0.15000	231.31
824	0.05000	359.49	0.08000	359.49	1.00001	314.43	0.05000	269.36	0.05000	250.30	0.15000	231.23
825	0.05000	359.41	0.08000	359.41	1.00001	313.30	0.05000	267.18	0.05000	249.01	0.15000	230.84
826	0.05000	360.67	0.08000	360.67	1.00001	312.51	0.05000	264.35	0.05000	247.38	0.15000	230.40
827	0.05000	363.67	0.08000	363.67	1.00000	312.59	0.05000	261.51	0.05000	245.75	0.15000	229.99
828	0.05000	366.97	0.08000	366.97	1.00000	313.26	0.05000	259.56	0.05000	244.64	0.15000	229.72
829	0.05000	373.43	0.08000	373.43	1.00000	316.72	0.05000	260.01	0.05000	245.70	0.15000	231.39
857	0.05000	381.56	0.08000	381.56	1.00000	331.35	0.05000	281.14	0.05000	258.52	0.15000	235.90
858	0.05000	378.06	0.08000	378.06	1.00000	329.16	0.05000	281.14	0.05000	258.52		235.90
											0.15000	
859	0.05000	374.68	0.08000	374.68	1.00000	326.99	0.05000	279.29	0.05000	257.36	0.15000	235.42
860	0.05000	371.72	0.08000	371.72	1.00000	324.80	0.05000	277.89	0.05000	256.65	0.15000	235.42
861	0.05000	369.12	0.08000	369.12	1.00000	322.52	0.05000	275.92	0.05000	255.88	0.15000	235.83
862	0.05000	367.56	0.08000	367.56	1.00000	320.73	0.05000	273.89	0.05000	255.22	0.15000	236.55
863	0.05000	367.34	0.08000	367.34	1.00000	319.79	0.05000	272.24	0.05000	254.80	0.15000	237.36
864	0.05000	368.36	0.08000	368.36	1.00000	319.77	0.05000	271.18	0.05000	254.65	0.15000	238.13
865	0.05000	369.91	0.08000	369.91	1.00000	320.14	0.05000	270.36	0.05000	254.45	0.15000	238.54
866	0.05000	373.58	0.08000	373.58	1.00000	321.61	0.05000	269.65	0.05000	254.42	0.15000	239.19
867	0.05000	379.40	0.08000	379.40	1.00000	324.37	0.05000	269.34	0.05000	254.63	0.15000	239.93
868	0.05000	384.90	0.08000	384.90	1.00000	327.15	0.05000	269.40	0.05000	254.95	0.15000	240.49
869	0.05000	393.92	0.08000	393.92	1.00000	332.96	0.05000	272.00	0.05000	257.66	0.15000	243.32
897	0.05000	388.03	0.08000	388.03	1.00000	334.91	0.05000	281.78	0.05000	259.53	0.15000	237.28
898	0.05000	383.21	0.08000	383.21	1.00000	331.44	0.05000	279.66	0.05000	258.66	0.15000	237.66
899	0.05000	379.59	0.08000	379.59	1.00000	328.80	0.05000	278.01	0.05000	258.03	0.15000	238.04
900	0.05000	376.37	0.08000	376.37	1.00000	326.33	0.05000	276.28	0.05000	257.45	0.15000	238.62
901	0.05000	373.76	0.08000	373.76	1.00000	324.13	0.05000	274.49	0.05000	257.01	0.15000	239.53
902	0.05000	372.59	0.08000	372.59	1.00000	322.84	0.05000	273.09	0.05000	256.90	0.15000	240.71
903	0.05000	373.17	0.08000	373.17	1.00000	322.76	0.05000	272.35	0.05000	257.19	0.15000	242.03
904	0.05000	375.10	0.08000	375.10	1.00000	323.67	0.05000	272.25	0.05000	257.77	0.15000	243.28
905	0.05000	377.57	0.08000	377.57	1.00000	325.01	0.05000	272.46	0.05000	258.28	0.15000	244.11
906	0.05000	382.55	0.08000	382.55	1.00000	327.87	0.05000	273.19	0.05000	259.22	0.15000	245.25
907	0.05000	389.86	0.08000	389.86	1.00000	332.18	0.05000	274.49	0.05000	260.50	0.15000	246.52
907	0.05000	396.54		396.54				274.49				240.52
			0.08000		1.00000	336.15	0.05000		0.05000	261.63	0.15000	
909	0.05000	406.90	0.08000	406.90	1.00000	343.24	0.05000	279.58	0.05000	265.23	0.15000	250.88

OPTIMIZATION SYSTEM FOR TPSSYM = TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 2324
TOTAL NUMBER OF TEMP. PRINTOUTS = 594 MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES х 0 1.0 в 0.5197E+03 D F В .30 .40 .50 .60 .70 TIME (X 1.401E-44) .20 .10 .80 .90 1.00 1.10 .70
 MAXIMUM TEMPERATURE OF EVERY LAYER

 LAYER:
 1
 2
 3
 4
 5

 Tmax:
 2300.33
 2020.33
 1800.33
 2020.33
 550.33

 Optv:
 519.75
 519.75
 301.98
 301.98
 264.86
 300.33 264.86 VALUES OF DESIGN VARIABLES:

ER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09

1 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000

2 0.08000 0. LAYER 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 4 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 5 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 THE ORIGINAL OBJECTIVE FUNCTION = 636.2790527 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028189 THE TOTAL OPTIMAL WEIGHT = 4.39993838E+05 MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.5028E+00 1.0 A 0.0 -1.0 + 1.00 1.20 1.30 1.40 1.50 1.60 TIME (X 0.000E+00) 1.60 1.70 1.80 1.90 2.00 OPTIMAL STRUCTURES OF TPS FOR PATCH = (WITH AVERAGE THICKNESS) _____ 0.05000 in. 519.7 F HRSI COAT thin skin -----

0.08000 in. 519.7 F

0.99998 in. 302.0 F

AB312 Fabric

Q-Felt(3.5 PCF) thin skin

slab

		AB312	Fabric	slab		i 0.050	00 in. 30	2.0 F		
======	=======	RTV-56		thin		=	00 in. 26	4.9 F		
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		ALUMIN	UM 2024-T4	slab		i	00 in. 26	4.9 F		
======	=======		=======	.======		=				
	THICKNESS	AND TEMPE	RATURE OF I	AYERS FOR	PATCH =	5				
PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05	
937	0.05000	519.75	0.08000	519.75	1.00000	410.87	0.05000	301.98	0.05000	279.26
938	0.05000	497.92	0.08000	497.92	1.00000	398.66	0.05000	299.39	0.05000	277.12
939	0.05000	479.63	0.08000	479.63	1.00000	388.36	0.05000	297.10	0.05000	275.27
940	0.05000	460.33	0.08000	460.33	1.00000	377.45	0.05000	294.57	0.05000	273.24
941	0.05000	439.75	0.08000	439.75	1.00000	365.71	0.05000	291.66	0.05000	270.97
942	0.05000	421.53	0.08000	421.53	1.00000	355.15	0.05000	288.78	0.05000	268.81
943	0.05000	407.70	0.08000	407.70	1.00000	346.95	0.05000	286.19	0.05000	266.96
944	0.05000	399.44	0.08000	399.44	1.00000	341.82	0.05000	284.20	0.05000	265.63
945	0.05000	399.44	0.08000	394.94	1.00000	338.68	0.05000	282.41	0.05000	264.51
946	0.05000	399.44	0.08000	393.77	1.00000	337.07	0.05000	280.36	0.05000	263.36
947	0.05000	399.44	0.08000	398.47	1.00000	338.55	0.05000	278.63	0.05000	262.59
948	0.05000	405.73	0.08000	405.73	1.00000	341.69	0.05000	277.64	0.05000	262.31
949	0.05000	413.54	0.08000	413.54	1.00000	345.50	0.05000	277.47	0.05000	262.68
977	0.05000	519.40	0.08000	519.40	1.00000	410.69	0.05000	301.98	0.05000	279.31
978	0.05000	497.49	0.08000	497.49	1.00000	398.41	0.05000	299.32	0.05000	277.17
979	0.05000	479.33	0.08000	479.33	1.00000	388.13	0.05000	296.93	0.05000	275.27
980	0.05000	460.41	0.08000	460.41	0.99999	377.35	0.05000	294.29	0.05000	273.15
981	0.05000	440.26	0.08000	440.26	0.99999	365.76	0.05000	291.26	0.05000	270.77
982	0.05000	422.44	0.08000	422.44	0.99999	355.35	0.05000	288.26	0.05000	268.48
983	0.05000	408.91	0.08000	408.91	0.99999	347.23	0.05000	285.55	0.05000	266.50
984	0.05000	400.78	0.08000	400.78	0.99999	342.13	0.05000	283.48	0.05000	265.08
985	0.05000	399.44	0.08000	396.25	0.99999	338.96	0.05000	281.66	0.05000	263.90
986	0.05000	399.44	0.08000	394.84	0.99999	337.22	0.05000	279.60	0.05000	262.70
987	0.05000	399.44	0.08000	399.11	0.99999	338.49	0.05000	277.86	0.05000	261.87
988	0.05000	405.92	0.08000	405.92	1.00000	341.40	0.05000	276.88	0.05000	261.57
989	0.05000	413.39	0.08000	413.39	1.00000	345.05	0.05000	276.71	0.05000	261.92
1017	0.05000	518.70	0.08000	518.70	1.00000	410.33	0.05000	301.97	0.05000	279.42
1018	0.05000	496.68	0.08000	496.68	1.00000	397.94	0.05000	299.19	0.05000	277.25
1019	0.05000	478.81	0.08000	478.81	0.99999	387.72	0.05000	296.63	0.05000	275.26
1020	0.05000	460.54	0.08000	460.54	0.99998	377.17	0.05000	293.80	0.05000	272.99
1021	0.05000	441 18	0 08000	441 18	n 99998	365 88	0 05000	290 57	0 05000	270 41

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461.09

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492.62

476 90

461.51

445.55

431.62

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		455.05		455.05								
1179	0.05000	476.35	0.08000	476.35	0.99995	385.68	0.05000	295.01	0.05000	275.34	0.15000	255.67
1180	0.05000	462.03	0.07999	462.03	0.99993	376.66	0.05000	291.29	0.05000	272.29	0.15000	253.28
1181	0.05000	447.36	0.07999	447.36	0.99990	367.15	0.05000	286.95	0.05000	268.66	0.15000	250.37
1182	0.05000	434.67	0.07999	434.67	0.99988	358.62	0.05000	282.56	0.05000	264.97	0.15000	247.38
1183	0.05000	424.94	0.07999	424.94	0.99986	351.76	0.05000	278.58	0.05000	261.61	0.15000	244.64
1184	0.05000	418.68	0.07999	418.68	0.99986	347.09	0.05000	275.50	0.05000	259.00	0.15000	242.51
1185	0.05000	414.39	0.07999	414.39	0.99986	343.64	0.05000	272.89	0.05000	256.79	0.15000	240.69
1186	0.05000	410.83	0.07999	410.83	0.99988	340.37	0.05000	269.91	0.05000	254.26	0.15000	238.62
1187	0.05000	409.42	0.07999	409.42	0.99992	338.39	0.05000	267.35	0.05000	252.09	0.15000	236.83
1188	0.05000	409.77	0.08000	409.77	0.99996	337.82	0.05000	265.87	0.05000	250.83	0.15000	235.79
									0.05000			
1189	0.05000	410.88	0.08000	410.88	1.00000	337.94	0.05000	265.00		250.11	0.15000	235.22
1217	0.05000	507.52	0.08000	507.52	1.00000	404.66	0.05000	301.79	0.05000	281.06	0.15000	260.33
1218	0.05000	489.60	0.08000	489.60	0.99997	393.84	0.05000	298.09	0.05000	278.14	0.15000	258.20
1219	0.05000	475.88	0.08000	475.88	0.99994	385.27	0.05000	294.65	0.05000	275.41	0.15000	256.17
1220	0.05000	462.63	0.07999	462.63	0.99991	376.69	0.05000	290.76	0.05000	272.19	0.15000	253.62
1221	0.05000	449.25	0.07999	449.25	0.99988	367.72	0.05000	286.19	0.05000	268.34	0.15000	250.49
1222	0.05000	437.81	0.07999	437.81	0.99985	359.69	0.05000	281.57	0.05000	264.40	0.15000	247.24
1223	0.05000	428.99	0.07999	428.99	0.99984	353.18	0.05000	277.37	0.05000	260.79	0.15000	244.20
1224	0.05000	423.18	0.07999	423.18	0.99983	348.65	0.05000	274.12	0.05000	257.96	0.15000	241.80
1225	0.05000	418.99	0.07999	418.99	0.99984	345.17	0.05000	271.35	0.05000	255.53	0.15000	239.72
1226	0.05000	414.95	0.07999	414.95	0.99986	341.54	0.05000	268.14	0.05000	252.70	0.15000	237.25
1227	0.05000	412.16	0.07999	412.16	0.99991	338.73	0.05000	265.30	0.05000	250.15	0.15000	235.00
1228	0.05000	410.88	0.08000	410.88	0.99995	337.22	0.05000	263.56	0.05000	248.57	0.15000	233.58
1229	0.05000	410.22	0.08000	410.22	1.00000	336.30	0.05000	262.38	0.05000	247.48	0.15000	232.58
1257	0.05000	504.70	0.08000	504.70	1.00000	403.22	0.05000	301.74	0.05000	281.46	0.15000	261.19
1258	0.05000	488.18	0.08000	488.18	0.99997	393.03	0.05000	297.89	0.05000	278.36	0.15000	258.83
									0.05000			
1259	0.05000	475.48	0.07999	475.48	0.99994	384.92	0.05000	294.35		275.50	0.15000	256.66
1260	0.05000	463.28	0.07999	463.28	0.99990	376.80	0.05000	290.32	0.05000	272.15	0.15000	253.98
1261	0.05000	451.16	0.07999	451.16	0.99987	368.37	0.05000	285.59	0.05000	268.13	0.15000	250.67
1262	0.05000	440.88	0.07999	440.88	0.99984	360.85	0.05000	280.82	0.05000	264.01	0.15000	247.20
1263	0.05000	432.90	0.07999	432.90	0.99982	354.69	0.05000	276.49	0.05000	260.21	0.15000	243.93
1264	0.05000	427.49	0.07999	427.49	0.99982	350.31	0.05000	273.13	0.05000	257.23	0.15000	241.32
1265	0.05000	423.33	0.07999	423.33	0.99983	346.80	0.05000	270.26	0.05000	254.65	0.15000	239.04
1266	0.05000	418.80	0.07999	418.80	0.99985	342.85	0.05000	266.90	0.05000	251.58	0.15000	236.26
1267	0.05000	414.73	0.07999	414.73	0.99990	339.27	0.05000	263.82	0.05000	248.73	0.15000	233.64
1268	0.05000	411.96	0.08000	411.96	0.99995	336.89	0.05000	261.82	0.05000	246.84	0.15000	231.87
1269	0.05000	409.64	0.08000	409.64	1.00000	334.97	0.05000	260.30	0.05000	245.40	0.15000	230.50
1297	0.05000	501.90	0.08000	501.90	1.00000	401.79	0.05000	301.68	0.05000	281.85	0.15000	262.03
1298	0.05000	486.75	0.08000	486.75	0.99996	392.23	0.05000	297.70	0.05000	278.59	0.15000	259.48
1299	0.05000	475.11	0.07999	475.11	0.99993	384.60	0.05000	294.08	0.05000	275.62	0.15000	257.17
	0.05000			464.03			0.05000		0.05000	272.16	0.15000	
1300		464.03	0.07999		0.99989	376.99		289.96				254.37
1301	0.05000	453.19	0.07999	453.19	0.99985	369.16	0.05000	285.13	0.05000	268.02	0.15000	250.91
1302	0.05000	444.08	0.07999	444.08	0.99982	362.19	0.05000	280.30	0.05000	263.78	0.15000	247.27
1303	0.05000	436.90	0.07998	436.90	0.99981	356.41	0.05000	275.93	0.05000	259.88	0.15000	243.83
1304	0.05000	431.82	0.07998	431.82	0.99981	352.18	0.05000	272.54	0.05000	256.81	0.15000	241.07
1305	0.05000	427.58	0.07999	427.58	0.99982	348.60	0.05000	269.62	0.05000	254.12	0.15000	238.62
1306	0.05000	422.42	0.07999	422.42	0.99985	344.28	0.05000	266.13	0.05000	250.86	0.15000	235.60
1307	0.05000	417.06	0.07999	417.06	0.99990	339.93	0.05000	262.81	0.05000	247.73	0.15000	232.65
1308	0.05000	412.84	0.08000	412.84	0.99995	336.68	0.05000	260.52	0.05000	245.55	0.15000	230.58
1309	0.05000	409.12	0.08000	409.12	1.00000	333.93	0.05000	258.73	0.05000	243.84	0.15000	229.20
1337	0.05000	498.35	0.08000	498.35	1.00000	399.97	0.05000	301.59	0.05000	282.33	0.15000	263.06
1338	0.05000	484.87	0.08000	484.87	0.99996	391.17	0.05000	297.47	0.05000	278.91	0.15000	260.34
1339	0.05000	474.68	0.07999	474.68	0.99992	384.23	0.05000	293.78	0.05000	275.83	0.15000	257.88
1340	0.05000	465.14	0.07999	465.14	0.99988	377.38	0.05000	289.63	0.05000	272.28	0.15000	254.94
1341	0.05000	455.90	0.07999	455.90	0.99984	370.36	0.05000	284.83	0.05000	268.08	0.15000	251.33
1342	0.05000	448.05	0.07999	448.05	0.99981	364.04	0.05000	280.04	0.05000	263.78	0.15000	247.53
1343	0.05000	441.62	0.07998	441.62	0.99980	358.67	0.05000	275.72	0.05000	259.83	0.15000	243.93
1344	0.05000	436.70	0.07998	436.70	0.99980	354.53	0.05000	272.37	0.05000	256.70	0.15000	241.04
1345	0.05000	432.22	0.07999	432.22	0.99982	350.84	0.05000	269.46	0.05000	253.96	0.15000	238.46
1346	0.05000	426.24	0.07999	426.24	0.99985	346.07	0.05000	265.89	0.05000	250.57	0.15000	235.26
1347	0.05000	419.43	0.07999	419.43	0.99990	340.87	0.05000	262.31	0.05000	247.17	0.15000	232.03
1348	0.05000	413.73	0.08000	413.73	0.99995	336.70	0.05000	259.67	0.05000	244.68	0.15000	229.68
1349	0.05000	408.63	0.08000	408.63	1.00000	333.08	0.05000	257.53	0.05000	242.66	0.15000	229.20
1377	0.05000	491.72	0.08000	491.72	1.00000	396.54	0.05000	301.36	0.05000	283.11	0.15000	264.86
1378	0.05000	481.67	0.08000	481.67	0.99995	389.42	0.05000	297.17	0.05000	279.49	0.15000	261.81
1379	0.05000	474.18	0.07999	474.18	0.99991	383.86	0.05000	293.54	0.05000	276.32	0.15000	259.10
1380	0.05000	467.15	0.07999	467.15	0.99988	378.35	0.05000	289.55	0.05000	272.74	0.15000	255.93
1381	0.05000	460.10	0.07999	460.10	0.99984	372.56	0.05000	285.03	0.05000	268.59	0.15000	252.15
1382	0.05000	453.65	0.07999	453.65	0.99982	367.12	0.05000	280.60	0.05000	264.43	0.15000	248.27
1383	0.05000	447.74	0.07998	447.74	0.99981	362.17	0.05000	276.59	0.05000	260.61	0.15000	244.63
1384	0.05000	442.68	0.07999	442.68	0.99982	358.03	0.05000	273.39	0.05000	257.54	0.15000	241.68
1384	0.05000	437.65	0.07999	437.65	0.99982	354.07	0.05000	270.49	0.05000	254.75	0.15000	239.02
1386	0.05000	437.65	0.07999	437.65	0.99987	348.60	0.05000	266.73	0.05000	251.17	0.15000	235.61
		430.46			0.99987		0.05000			251.17		
1387 1388	0.05000	421.93	0.07999 0.08000	421.93 414.67	0.99991	342.32 337.11	0.05000	262.71 259.54	0.05000	247.39	0.15000	232.07 229.39
									0.05000		0.15000	
1389	0.05000	408.13	0.08000	408.13	1.00000	332.47	0.05000	256.82	0.05000	242.00	0.15000	229.20 264.86
1417	0.05000	482.85	0.08000	482.85	1.00000	391.75	0.05000	300.65	0.05000	283.11	0.15000	
1418	0.05000	478.55	0.08000	478.55	0.99996	387.90	0.05000	297.26	0.05000	280.30	0.15000	263.34
1419	0.05000	475.03	0.07999	475.03	0.99993	384.73	0.05000	294.43	0.05000	277.53	0.15000	260.63
1420	0.05000	471.14	0.07999	471.14	0.99990	381.24	0.05000	291.34	0.05000	274.47	0.15000	257.61
1421	0.05000	466.35	0.07999	466.35	0.99988	377.05	0.05000	287.75	0.05000	270.90	0.15000	254.05
1422	0.05000	460.88	0.07999	460.88	0.99987	372.46	0.05000	284.05	0.05000	267.21	0.15000	250.38
1423	0.05000	454.91	0.07999	454.91	0.99987	367.67	0.05000	280.43	0.05000	263.65	0.15000	246.86
1424	0.05000	449.24	0.07999	449.24	0.99988	363.25	0.05000	277.27	0.05000	260.59	0.15000	243.91
1425	0.05000	443.37	0.07999	443.37	0.99989	358.77	0.05000	274.18	0.05000	257.66	0.15000	241.14
1426	0.05000	434.74	0.07999	434.74	0.99991	352.29	0.05000	269.84	0.05000	253.64	0.15000	237.44
1427	0.05000	424.37	0.08000	424.37	0.99995	344.61	0.05000	264.85	0.05000	249.13	0.15000	233.41
1428	0.05000	415.57	0.08000	415.57	0.99997	338.14	0.05000	260.71	0.05000	245.47	0.15000	230.23
1429	0.05000	407.64	0.08000	407.64	1.00000	332.32	0.05000	257.01	0.05000	242.26	0.15000	229.20
1457	0.05000	483.12	0.08000	483.12	1.00000	391.28	0.05000	299.44	0.05000	281.71	0.15000	263.97
1458	0.05000	481.41	0.08000	481.41	1.00000	390.09	0.05000	298.78	0.05000	280.68	0.15000	262.58
1459	0.05000	479.45	0.08000	479.45	1.00000	388.69	0.05000	297.93	0.05000	279.57	0.15000	261.20
1460	0.05000	476.65	0.08000	476.65	1.00000	386.64	0.05000	296.64	0.05000	278.03	0.15000	259.43
1461	0.05000	472.43	0.08000	472.43	1.00000	383.50	0.05000	294.56	0.05000	275.80	0.15000	257.03
1462	0.05000	466.90	0.08000	466.90	1.00000	379.31	0.05000	291.72	0.05000	272.94	0.15000	254.16

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1463 0.05000
                                0.08000
                                           460.38
                      460.38
                                                     1.00000
                                                                 374.33
                                                                          0.05000
                                                                                      288.27
                                                                                                0.05000
                                                                                                            269.65 0.15000
                                                                                                                                 251.02
    1464
           0.05000
                       454.03
                                0.08000
                                            454.03
                                                      1.00000
                                                                 369.43
                                                                           0.05000
                                                                                       284.83
                                                                                                0.05000
                                                                                                            266.48
                                                                                                                     0.15000
                                                                                                                                 248.13
    1465
           0.05000
                       447.42
437.70
                                0.08000
                                            447.42
437.70
                                                      1.00000
                                                                 364.31
                                                                           0.05000
                                                                                       281.20
                                                                                                0.05000
                                                                                                            263.22
                                                                                                                     0.15000
                                                                                                                                 245.25
                                                                 356.74
                                                                           0.05000
           0.05000
                                0.08000
                                                      1.00000
                                                                                       275.79
                                                                                                0.05000
                                                                                                            258.48
                                                                                                                     0.15000
                                                                                                                                 241.17
    1466
                                0.08000
                                                                 347.62
                                                                                                                     0.15000
0.15000
    1467
           0.05000
                       426.04
                                            426.04
                                                      1.00000
                                                                           0.05000
                                                                                       269.21
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                                                                                                            252.84
                                                                                                                                 236.47
                       416.20
                                            416.20
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                                                                                       263.61
                                                                                                            248.12
                                                                                                                                 232.62
    1468
                                                                 339.91
    1469
           0.05000
                       407.28
                                0.08000
                                            407.28
                                                      1.00000
                                                                  332.89
                                                                           0.05000
                                                                                       258.50
                                                                                                0.05000
                                                                                                            243.85
                                                                                                                     0.15000
                                                                                                                                 229.20
                     OPTIMIZATION SYSTEM FOR TPSSYM =
 TOTAL NUMBER OF DESIGN VARIABLES = 20
TOTAL NUMBER OF CONSTRAINS = 774
 TOTAL NUMBER OF CONSTRAINS = 774
TOTAL NUMBER OF TEMP. CONSTRAINS = 264
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.2287E+03
                   В
       Ď
                   F
                                F
                                             F
                                                                       D
F
                                                          D
   0.0 +----
  -1.0 +
                 .20 .30 .40 .50 .60 .70 TIME ( X 1.401E-44 )
       .10
                                                                                    .70
                                                                                              .80 .90
                                                                                                                       1.00 1.10
              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4 5 6
Tmax: 2300.33 2020.33 1800.33 2020.33 550.33 300.33
Optv: 228.68 228.68 176.35 176.35 156.91 156.91
                    VALUES OF DESIGN VARIABLES :
      DEV01 DEV02 DEV03 DEV04
0.05000 0.05000 0.05000 0.05000
LAYER
    2 0.08000 0.08000 0.08000 0.08000
    3 1.00000 1.00000 1.00000 1.00000
4 0.05000 0.05000 0.05000 0.05000
    5 0.05000 0.05000 0.05000 0.05000
                                       192.2937622
THE ORIGINAL OBJECTIVE FUNCTION =
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006
 THE TOTAL OPTIMAL WEIGHT = 2.39849037E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.5028E+00
1.0 A
   0.0
  -1.0 +
       1.00
                              1.20 1.30 1.40 1.50 1.60
TIME ( X 0.000E+00 )
                   1.10
                                                                                              1.70 1.80 1.90
                                                                                                                                    2.00
                                                                                   1.60
               OPTIMAL STRUCTURES OF TPS FOR PATCH = (WITH AVERAGE THICKNESS)
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_____
                     HRSI COAT
                                          thin skin
                                                                0.05000 in.
                      AB312 Fabric
                                            slab
                                                                0 08000 in
                                                                              228.7 F
                                                                 i
                     Q-Felt(3.5 PCF) thin skin
                                           thin skin
                                                                1.00000 in. 176.3 F
                                                                0.05000 in. 176.3 F
                      AB312 Fabric
                                           slab
______
                                                                0.05000 in.
                                                                             156.9 F
____
                      ALUMINUM 2024-T4
                                                                0.15000 in. 156.9 F
                                                                  i
THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                                6
 PANET.
         LAYER01
                              LAYER02
                                                   LAYER03
                                                                       LAYER04
                                                                                            LAYER05
                                                                                                                 LAYERO6
          0.05000
                     228.68
                              0.08000
                                          228.68
                                                   1.00000
                                                              202.51
                                                                       0.05000
                                                                                   176.35
                                                                                            0.05000
                                                                                                        166.63
                                                                                                                 0.15000
                                                                                                                            156.91
     30
     31
          0.05000
                     226.92
                              0.08000
                                          226.92
                                                   1.00000
                                                              200.91
                                                                        0.05000
                                                                                   174.90
                                                                                            0.05000
                                                                                                        165.24
                                                                                                                 0.15000
                                                                                                                            155.57
                     225.17
223.56
     32
          0.05000
                              0.08000
                                          225.17
                                                   1.00000
                                                              199.32
                                                                        0.05000
                                                                                   173.47
                                                                                            0.05000
                                                                                                        163.86
                                                                                                                 0.15000
                                                                                                                            154.25
                                          223.56
                              0.08000
                                                   1.00000
                                                                                             0.05000
                                                                                                        162.59
                     222.14
220.46
     34
          0.05000
                              0.08000
                                          222.14
                                                   1.00000
                                                              196.56
                                                                        0.05000
                                                                                   170.98
                                                                                            0.05000
                                                                                                        161.47
                                                                                                                 0.15000
                                                                                                                            151.96
                              0.08000
                                          220.46
                                                                                                        160.14
     35
          0.05000
                                                   1.00000
                                                              195.03
                                                                        0.05000
                                                                                   169.60
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                                                                                                                 0.15000
                                                                                                                            150.69
                                                                                                        158.63
157.26
     36
          0.05000
                     218.53
                              0.08000
                                          218.53
                                                   1.00000
                                                              193.28
                                                                       0.05000
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                                                                                                                            149.23
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                     216.79
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                                                              191.70
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          0.05000
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     38
                                                                                   165.29
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     39
          0.05000
                     213.63
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                                          213.63
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                                                              188.82
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                              0.08000
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          0.05000
                     226 67
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                                                              200 51
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          0.05000
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                                                              199.11
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          0.05000
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     73
          0.05000
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     75
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217.73
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                                                              191.07
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                                                              189.81
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     80
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    110
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                                                                                   162.32
                                                                                            0.05000
                                                                                                        152.34
                                                                                                                 0.15000
                                                                                                                            142.36
                   OPTIMIZATION SYSTEM FOR TPSSYM =
TOTAL NUMBER OF DESIGN VARIABLES = 30
TOTAL NUMBER OF CONSTRAINS
                               = 1634
TOTAL NUMBER OF TEMP. CONSTRAINS = 924
TOTAL NUMBER OF TEMP. PRINTOUTS = 11
```

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MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES

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1.0 B

0.4161E+03

```
-1.0
                   .20
       .10
                               .30 .40
                                                                  .60 .70
TIME ( X 1.401E-44 )
                                                                                                   .80 .90
                                                                                                                           1.00 1.10
                                                         .50

        MAXIMUM TEMPERATURE OF EVERY LAYER

        1
        2
        3
        4
        5

        2300.33
        2020.33
        1800.33
        2020.33
        550.33

        416.10
        416.10
        259.06
        259.06
        207.66

LAYER:
                                                          207.66
Optv:
   VALUES OF DESIGN VARIABLES:

DEV01 DEV02 DEV03 DEV04 DEV05 DEV06

1 0.05000 0.05000 0.05000 0.05000 0.05000

2 0.08000 0.08000 0.08000 0.08000 0.08000
LAYER
    3 1.00000 1.00000 1.00000 1.00000 1.00000
4 0.05000 0.05000 0.05000 0.05000 0.05000
                                                        1.00000
                                                        0.05000
       0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
 THE ORIGINAL OBJECTIVE FUNCTION =
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006
 THE TOTAL OPTIMAL WEIGHT = 4.16978895E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.4258E+01
1.0 +
   0 0 +-----
  -1.0 +
                                                                  .59 .69
TIME ( X 1.401E-44 )
                                                                                                   .79
                                                                                                                                         1.09
                OPTIMAL STRUCTURES OF TPS FOR PATCH = (WITH AVERAGE THICKNESS)
 -----
                                                                      0.05000 in.
                                                                                    416.1 F
                        HRST COAT
                                       thin skin
 ______
                        AB312 Fabric
                                               slab
                                                                      0.08000 in.
                                                                                     416.1 F
                         Q-Felt(3.5 PCF)
                                                                      1.00000 in.
                                                                                     259.1 F
         _____
                                                                      ----
                        AB312 Fabric
                                               slab
                                                                      0.05000 in.
                                                                                    259.1 F
                        RTV-560
                                                                      0.05000 in.
                                                                                     207.7 F
                                               thin skin
                                                                      0.15000 in.
                        ALUMINUM 2024-T4
                                               slab
 -----
          THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
```

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
230	0.05000	237.42	0.08000	237.42	1.00000	210.52	0.05000	183.62	0.05000	175.36	0.15000	167.09
231	0.05000	230.26	0.08000	230.26	1.00000	205.51	0.05000	180.76	0.05000	172.19	0.15000	163.61
232	0.05000	225.63	0.08000	225.63	1.00000	202.21	0.05000	178.78	0.05000	169.94	0.15000	161.10
233	0.05000	225.49	0.08000	223.72	1.00000	200.76	0.05000	177.79	0.05000	168.73	0.15000	159.66
234	0.05000	225.49	0.08000	223.58	1.00000	200.51	0.05000	177.43	0.05000	168.21	0.15000	158.98
235	0.05000	225.49	0.08000	225.49	1.00000	201.60	0.05000	177.72	0.05000	168.35	0.15000	158.98
236 237	0.05000 0.05000	230.63 237.89	0.08000	230.63 237.89	1.00000	204.86 209.56	0.05000	179.09 181.23	0.05000	169.58 171.64	0.15000 0.15000	160.08 162.04
237	0.05000	246.23	0.08000	246.23	1.00000	215.00	0.05000	183.78	0.05000	174.16	0.15000	164.53
239	0.05000	256.10	0.08000	256.10	1.00000	221.48	0.05000	186.86	0.05000	177.21	0.15000	167.55
240	0.05000	270.08	0.08000	270.08	1.00000	230.71	0.05000	191.34	0.05000	181.75	0.15000	172.15
270	0.05000	240.40	0.08000	240.40	1.00000	211.73	0.05000	183.07	0.05000	174.63	0.15000	166.19
271	0.05000	241.54	0.08000	241.54	1.00000	213.08	0.05000	184.62	0.05000	175.27	0.15000	165.92
272	0.05000	243.07	0.08000	243.07	1.00000	214.46	0.05000	185.86	0.05000	175.75	0.15000	165.64
273 274	0.05000 0.05000	245.14 247.03	0.08000	245.14 247.03	1.00000	216.01 217.26	0.05000	186.88 187.50	0.05000 0.05000	176.18 176.40	0.15000 0.15000	165.49 165.30
275	0.05000	249.70	0.08000	249.70	1.00000	218.88	0.05000	188.05	0.05000	176.60	0.15000	165.15
276	0.05000	252.85	0.08000	252.85	1.00000	220.54	0.05000	188.24	0.05000	176.59	0.15000	164.95
277	0.05000	256.67	0.08000	256.67	1.00000	222.53	0.05000	188.39	0.05000	176.69	0.15000	164.99
278	0.05000	260.49	0.08000	260.49	1.00000	224.44	0.05000	188.40	0.05000	176.78	0.15000	165.16
279	0.05000	265.00	0.08000	265.00	1.00000	226.73	0.05000	188.47	0.05000	176.99	0.15000	165.50
280	0.05000	271.17	0.08000	271.17	1.00000	229.88	0.05000	188.58	0.05000	177.42	0.15000	166.26
310 311	0.05000 0.05000	244.31 256.52	0.08000	244.31	1.00000	213.33	0.05000	182.35	0.05000	173.67	0.15000	164.99
312	0.05000	266.22	0.08000	256.52 266.22	1.00000	223.13 230.73	0.05000 0.05000	189.75 195.24	0.05000 0.05000	179.36 183.45	0.15000 0.15000	168.97 171.66
313	0.05000	273.53	0.08000	273.53	1.00000	236.23	0.05000	198.92	0.05000	186.07	0.15000	173.21
314	0.05000	278.46	0.08000	278.46	1.00000	239.73	0.05000	201.00	0.05000	187.39	0.15000	173.78
315	0.05000	282.81	0.08000	282.81	1.00000	242.49	0.05000	202.18	0.05000	187.89	0.15000	173.59
316	0.05000	283.67	0.08000	283.67	1.00000	242.29	0.05000	200.92	0.05000	186.32	0.15000	171.71
317	0.05000	283.14	0.08000	283.14	1.00000	240.81	0.05000	198.49	0.05000	183.82	0.15000	169.15
318 319	0.05000 0.05000	281.14 278.20	0.08000	281.14 278.20	1.00000	238.11 234.54	0.05000	195.09 190.88	0.05000 0.05000	180.58 176.69	0.15000 0.15000	166.08 162.49
320	0.05000	272.88	0.08000	272.88	1.00000	228.66	0.05000	184.45	0.05000	170.09	0.15000	157.38
350	0.05000	249.32	0.08000	249.32	1.00000	215.38	0.05000	181.43	0.05000	172.45	0.15000	163.47
351	0.05000	275.63	0.08000	275.63	1.00000	235.95	0.05000	196.28	0.05000	184.57	0.15000	172.87
352	0.05000	295.79	0.08000	295.79	1.00000	251.51	0.05000	207.22	0.05000	193.29	0.15000	179.35
353	0.05000	309.85	0.08000	309.85	1.00000	262.09	0.05000	214.33	0.05000	198.71	0.15000	183.09
354	0.05000	318.89	0.08000	318.89	1.00000	268.63	0.05000	218.36	0.05000	201.52	0.15000	184.69
355 356	0.05000 0.05000	325.81 324.11	0.08000	325.81 324.11	1.00000	273.16 270.84	0.05000	220.52 217.58	0.05000 0.05000	202.55 199.09	0.15000 0.15000	184.57 180.60
357	0.05000	318.28	0.08000	318.28	1.00000	265.09	0.05000	211.90	0.05000	193.30	0.15000	174.70
358	0.05000	308.92	0.08000	308.92	1.00000	256.51	0.05000	204.10	0.05000	185.72	0.15000	167.34
359	0.05000	296.16	0.08000	296.16	1.00000	245.16	0.05000	194.16	0.05000	176.28	0.15000	158.41
360	0.05000	275.25	0.08000	275.25	1.00000	227.00	0.05000	178.76	0.05000	161.96	0.15000	145.17
390	0.05000	254.11	0.08000	254.11	1.00000	217.33	0.05000	180.55	0.05000	171.28	0.15000	162.01
391 392	0.05000 0.05000	293.88	0.08000	293.88 324.04	1.00000	248.20	0.05000	202.51 218.67	0.05000 0.05000	189.55	0.15000 0.15000	176.58
392	0.05000	324.04 344.58	0.08000	344.58	1.00000	271.35 286.82	0.05000 0.05000	229.05	0.05000	202.68 210.80	0.15000	186.70 192.54
394	0.05000	357.63	0.08000	357.63	1.00000	296.31	0.05000	234.99	0.05000	215.06	0.15000	195.14
395	0.05000	367.13	0.08000	367.13	1.00000	302.64	0.05000	238.16	0.05000	216.65	0.15000	195.13
396	0.05000	363.11	0.08000	363.11	1.00000	298.38	0.05000	233.65	0.05000	211.42	0.15000	189.19
397	0.05000	352.28	0.08000	352.28	1.00000	288.59	0.05000	224.89	0.05000	202.48	0.15000	180.08
398 399	0.05000 0.05000	335.89 313.59	0.08000	335.89 313.59	1.00000	274.37 255.46	0.05000 0.05000	212.85 197.33	0.05000 0.05000	190.71 175.88	0.15000 0.15000	168.58 154.44
400	0.05000	277.53	0.08000	277.53	1.00000	225.36	0.05000	173.19	0.05000	153.22	0.15000	133.24
430	0.05000	257.57	0.08000	257.57	1.00000	218.74	0.05000	179.91	0.05000	170.43	0.15000	160.96
431	0.05000	307.04	0.08000	307.04	1.00000	257.02	0.05000	207.00	0.05000	193.13	0.15000	179.25
432	0.05000	344.40	0.08000	344.40	1.00000	285.66	0.05000	226.91	0.05000	209.45	0.15000	191.99
433	0.05000	369.60	0.08000	369.60	1.00000	304.63	0.05000	239.66	0.05000	219.51	0.15000	199.35
434	0.05000	385.48	0.08000	385.48	1.00000	316.21	0.05000	246.95	0.05000	224.80	0.15000	202.66
435 436	0.05000 0.05000	396.73 390.94	0.08000	396.73 390.94	1.00000	323.76 318.03	0.05000	250.80 245.12	0.05000 0.05000	226.75 220.23	0.15000 0.15000	202.71 195.33
437	0.05000	376.41	0.08000	376.41	1.00000	305.26	0.05000	234.11	0.05000	209.01	0.15000	183.91
438	0.05000	354.94	0.08000	354.94	1.00000	287.00	0.05000	219.05	0.05000	194.27	0.15000	169.49
439	0.05000	325.92	0.08000	325.92	1.00000	262.77	0.05000	199.62	0.05000	175.66	0.15000	151.70
440	0.05000	279.22	0.08000	279.22	1.00000	224.30	0.05000	169.37	0.05000	147.18	0.15000	124.99
470	0.05000	259.89	0.08000	259.89	1.00000	219.69	0.05000	179.48	0.05000	169.87	0.15000	160.25
471 472	0.05000	315.84 358.01	0.08000	315.84	1.00000	262.92	0.05000	210.00	0.05000	195.52	0.15000 0.15000	181.04
472	0.05000 0.05000	386.28	0.08000	358.01 386.28	1.00000	295.21 316.51	0.05000	232.42 246.73	0.05000 0.05000	213.97 225.31	0.15000	195.52 203.88
474	0.05000	403.92	0.08000	403.92	1.00000	329.39	0.05000	254.86	0.05000	231.25	0.15000	207.63
475	0.05000	416.10	0.08000	416.10	1.00000	337.58	0.05000	259.06	0.05000	233.36	0.15000	207.66
476	0.05000	408.91	0.08000	408.91	1.00000	330.72	0.05000	252.53	0.05000	225.92	0.15000	199.30
477	0.05000	391.72	0.08000	391.72	1.00000	315.84	0.05000	239.96	0.05000	213.15	0.15000	186.34
478	0.05000	366.68	0.08000	366.68	1.00000	294.77	0.05000	222.85	0.05000	196.43	0.15000	170.01 149.95
479 480	0.05000 0.05000	333.12 279.88	0.08000	333.12 279.88	1.00000	266.99 223.42	0.05000 0.05000	200.86 166.97	0.05000 0.05000	175.40 143.50	0.15000 0.15000	120.03
100												,

```
TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 2124
TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
X 0.7887E+03
1.0 B
| B
```

```
В
                                                                                       В
  0.0
 -1.0
                                                                     .80
                                         .50 .60 .70
TIME ( X 1.401E-44 )
                                                                              .90
     .10
              .20
                                .40
                                                                                      1.00
                                                                                               1.10
           MAXIMUM TEMPERATURE OF EVERY LAYER
    1 2 3 4 5
2300.33 2020.33 1800.33 2020.33 550.33
788.72 788.72 367.77 367.77 292.90
LAYER:
                                         300.33
Tmax:
              VALUES OF DESIGN VARIABLES :
    DEV01 DEV02 DEV03 DEV04 0.12585 0.10902 0.12331 0.12784
                                 DEV05
LAYER
                                         DEV06
                                                DEV07
                                                      DEV08
                                                             DEV09
                                0.07423 0.07285
                                              0.05109
                                                     0.11797
  2 0.08000 0.08811 0.08254 0.10758 0.12711
3 1.00000 1.02411 1.03175 1.01521 1.06436
                                       0.12225
                                              0.09889
                                                     0.17046
                                                            0.09412
                                       1.09939
                                              1.02171
                                                     1.09392
                                                            1.17647
            0.05121
                  0.05159 0.05076
                                0.05322
                                       0.05497
                                              0.05109
   5 0.05000 0.05121 0.05159 0.05076 0.08572 0.05497 0.05109 0.09499
                                                            0.05882
THE ORIGINAL OBJECTIVE FUNCTION =
                            220 3228912
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.7153327
THE TOTAL OPTIMAL WEIGHT = 5.66354956E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X
1.0 +
     0.5302E+01
                                                                       AAAAAAAAAAA AAAAAAAAAA
                                                                                          AA AAAAAA
     AAAA AAA
     AAAAAA
  0.0
 -1.0
              .10
                      .20
                           .30
                                          .40
                                                   .50
                                                                     .70
                                                                              .80
                                                                                      .90
                                                                                               1.00
                                              TIME ( X 2.943E-43 )
           OPTIMAL STRUCTURES OF TPS FOR PATCH =
               (WITH AVERAGE THICKNESS)

HRSI COAT thin skin
                                                 0.09389 in.
                                                          788.7 F
-----
                                                 ----
                 AB312 Fabric
                                 slab
                                                 0.11561 in. 788.7 F
                                                 i
-----
_____
                O-Felt(3.5 PCF) thin skin
                                                 1.06690 in. 367.8 F
i
                RTV-560
                                thin skin
                                                 0.06586 in. 292.9 F
        ----
                                                 0.15000 in. 292.9 F
                 ALUMINUM 2024-T4
                                 slab
_____
       THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                              LAYER04
  PANEL LAYER01
                      LAYER02
                                      LAYER03
                                                                    LAYER05
                                                                                  LAYER06
```

510	0.12585	212.72	0.08000	212.72	1.00000	187.54	0.05000	162.35	0.05000	153.56	0.15000	144.78
511	0.11652	222.83	0.08434	222.83	1.01013	193.87	0.05051	164.91	0.05051	154.35	0.15000	144.78
512	0.11093	225.82	0.08705	225.82	1.01013	194.88	0.05091	163.93	0.05031	152.36	0.15000	140.78
513	0.10902	222.33	0.08811	222.33	1.02411	191.12	0.05121	159.90	0.05121	148.07	0.15000	136.23
514	0.10987	213.96	0.08795	213.96	1.02799	183.81	0.05139	153.67	0.05121	142.18	0.15000	130.23
515	0.11410	198.07	0.08635	198.07	1.03086	170.69	0.05153	143.31	0.05144	132.87	0.15000	122.43
516	0.12331	172.46	0.08254	172.46	1.03175	150.11	0.05159	127.75	0.05159	119.32	0.15000	110.89
550	0.13178	186.22	0.08720	186.22	1.00328	168.12	0.05015	150.02	0.05133	142.49	0.15000	134.95
551	0.11509	202.25	0.08932	202.25	1.01407	179.14	0.05000	156.03	0.05400	147.34	0.15000	138.66
552	0.10560	208.01	0.00932	208.01	1.02286	182.28	0.05000	156.54	0.05568	147.10	0.15000	137.67
553	0.10116	204.82	0.09265	204.82	1.02260	178.70	0.05012	152.58	0.05648	143.04	0.15000	133.50
554	0.10076	196.12	0.09311	196.12	1.03441	171.01	0.05045	145.89	0.05637	136.65	0.15000	127.41
555	0.10498	179.63	0.09254	179.63	1.03802	157.13	0.05106	134.62	0.05500	126.12	0.15000	117.62
556	0.11586	172.46	0.09010	154.60	1.03912	136.53	0.05195	119.32	0.05197	111.18	0.15000	110.89
590	0.13599	172.46	0.09514	167.99	1.00726	154.64	0.05030	141.28	0.05066	134.73	0.15000	128.18
591	0.11293	183.32	0.09654	183.32	1.01962	165.46	0.05000	147.60	0.05878	140.94	0.15000	134.28
592	0.09829	189.48	0.09833	189.48	1.02999	169.05	0.05000	148.63	0.06286	141.80	0.15000	134.97
593	0.09034	186.85	0.10014	186.85	1.03848	165.85	0.05000	144.84	0.06447	138.10	0.15000	131.36
594	0.08806	177.91	0.10146	177.91	1.04484	157.76	0.05000	137.61	0.06382	131.10	0.15000	124.60
595	0.09210	172.46	0.10208	160.53	1.04989	142.83	0.05082	125.13	0.05996	118.92	0.15000	112.71
596	0.10437	172.46	0.10110	150.11	1.05172	127.75	0.05259	119.32	0.05259	110.89	0.15000	110.89
630	0.13583	173.13	0.10280	173.13	1.01161	157.98	0.05053	142.83	0.05104	136.33	0.15000	129.84
631	0.11012	182.43	0.10600	182.43	1.02639	164.40	0.05000	146.38	0.06429	140.77	0.15000	135.17
632	0.09085	187.55	0.10898	187.55	1.03963	167.28	0.05000	147.02	0.07202	141.93	0.15000	136.84
633	0.07886	186.28	0.11189	186.28	1.05124	164.97	0.05000	143.66	0.07518	138.86	0.15000	134.06
634	0.07413	178.39	0.11403	178.39	1.06061	157.44	0.05019	136.49	0.07371	131.76	0.15000	127.03
635	0.07732	172.46	0.11488	160.20	1.06841	141.68	0.05170	123.17	0.06597	118.23	0.15000	113.28
636	0.08869	172.46	0.11396	150.11	1.07197	127.75	0.05360	119.32	0.05360	110.89	0.15000	110.89
670	0.12784	220.08	0.10758	220.08	1.01521	191.56	0.05076	163.04	0.05076	154.82	0.15000	146.61
671	0.10686	223.89	0.11597	223.89	1.03260	193.23	0.05163	162.57	0.06865	155.34	0.15000	148.11
672	0.08768	232.06	0.12248	232.06	1.04956	197.86	0.05233	163.66	0.08053	156.88	0.15000	150.10
673	0.07432	236.71	0.12720	236.71	1.06539	199.63	0.05327	162.55	0.08577	155.76	0.15000	148.97
674	0.06735	232.84	0.12901	232.84	1.07927	195.12	0.05412	157.40	0.08358	150.39	0.15000	143.38
675	0.06687	215.82	0.12700	215.82	1.09190	180.87	0.05471	145.92	0.07198	138.58	0.15000	131.23
676	0.07285	189.80	0.12225	189.80	1.09939	160.32	0.05497	130.85	0.05497	123.22	0.15000	115.58
710	0.11022	307.66	0.10930	307.66	1.01917	254.43	0.05117	201.20	0.05201	189.59	0.15000	177.98
711	0.10088	313.25	0.12457	313.25	1.03828	255.92	0.05537	198.58	0.07200	186.65	0.15000	174.71
712	0.08896	328.53	0.13612	328.53	1.05882	264.62	0.05871	200.71	0.08648	187.99	0.15000	175.27
713	0.07916	338.97	0.14227	338.97	1.07915	270.27	0.06087	201.56	0.09245	188.04	0.15000	174.51
714	0.07181	339.25	0.14136	339.25	1.09805	269.36	0.06121	199.47	0.08854	185.49	0.15000	171.51
715	0.06556	321.79	0.13118	321.79	1.11654	256.66	0.05891	191.52	0.07217	177.89	0.15000	164.26
716	0.06318	300.56	0.12085	300.56	1.12576	241.71	0.05629	182.86	0.05629	169.92	0.15000	156.97
750	0.08924	415.88	0.10749	415.88	1.02121	332.33	0.05153	248.78	0.05224	232.78	0.15000	216.77
751	0.09485	425.27	0.12969	425.27	1.04091	334.89	0.05959	244.51	0.07260	226.24	0.15000	207.97
752	0.09519	451.93	0.14709	451.93	1.06382	350.42	0.06650	248.91	0.08841	227.77	0.15000	206.63
753	0.09263	470.95	0.15517	470.95	1.08800	361.89	0.07039	252.82	0.09529	229.64	0.15000	206.45
754	0.08501	475.18	0.15045	475.18	1.11202	364.88	0.06972	254.58	0.09098	230.97	0.15000	207.36
755	0.06974	458.94	0.12980	458.94	1.13658	355.81	0.06322	252.68	0.07289	230.86	0.15000	209.04
756	0.05874	457.24	0.11133	457.24	1.15106	357.32	0.05755	257.39	0.05755	236.63	0.15000	215.86
790	0.06869	517.61	0.10342	517.61	1.02178	405.81	0.05146	294.00	0.05173	273.93	0.15000	253.85
791	0.08792	532.25	0.13127	532.25	1.04120	410.69	0.06293	289.13	0.07143	264.86	0.15000	240.58
792	0.10132	567.38	0.15414	567.38	1.06524	430.98	0.07327	294.59	0.08774	265.41	0.15000	236.23
793	0.10739	593.14	0.16468	593.14	1.09237	446.81	0.07909	300.49	0.09559	267.99	0.15000	235.49
794 795	0.10034 0.07807	599.42 586.99	0.15677 0.12820	599.42 586.99	1.12063 1.14942	452.25 448.22	0.07753 0.06774	305.07 309.46	0.09172 0.07456	272.30 279.69	0.15000 0.15000	239.53 249.92
795 796	0.07807	586.99	0.12820	586.99	1.14942	448.22	0.05774	311.58	0.07456	279.69	0.15000	249.92
830	0.05825	570.56	0.10223	570.56	1.16584	441.07	0.05829	311.58	0.05829	285.06 307.54		258.55
											0.15000	
831 832	0.08100 0.10484	614.97 650.10	0.13081 0.15776	614.97 650.10	1.04061 1.06504	469.55 488.88	0.06500 0.07774	324.13 327.65	0.06993 0.08639	295.36 292.77	0.15000 0.15000	266.59 257.88
832	0.10484	677.28	0.15776		1.06504	488.88 505.31	0.07774	327.65	0.08639			257.88
833	0.11797	677.28	0.17046	677.28 677.28	1.12463	505.31	0.08502	333.34	0.09499	294.33 300.04	0.15000 0.15000	255.31
835	0.11216	675.63	0.18094	675.63	1.12463	508.46	0.08303	347.87	0.09184	312.23	0.15000	276.59
836	0.05882	661.68	0.12803	661.68	1.17647	508.46	0.05882	355.24	0.07827	324.07	0.15000	292.90
030	0.05002	001.00	0.00112	001.00	1.1/01/	300.10	0.03002	333.21	0.05002	321.07	3.13000	2,2.,0

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 976
TOTAL NUMBER OF TEMP. CONSTRAINS = 880
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.5062\text{E}{+}03 1.0 A
               Α
 0.0 -----
```

```
-1.0 +
                                                          .20 .30 .40 .50 .60 .70 TIME ( X 1.401E-44 )
                                                                                                                                                                                                                                                                 .70 .80 .90
                      .10
                                                                                                                                                                                                                                                                                                                                                              1.00
                                                                                                                                                                                                                                                                                                                                                                                                                 1.10
MAXIMUM TEMPERATURE OF EVERY LAYER
                                                                VALUES OF DESIGN VARIABLES :
         YER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09 DEV10 DEV11 DEV12 1 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.080000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000
                      0.30000
                                                   0.30000
                                                                                0.30000
                                                                                                              0.30000
                                                                                                                                          0.30401
                                                                                                                                                                       0.30000
                                                                                                                                                                                                    0.30000
                                                                                                                                                                                                                                 0.30305
                                                                                                                                                                                                                                                                0.30000
                                                                                                                                                                                                                                                                                             0.30000
                                                                                                                                                                                                                                                                                                                         0.30000
            3 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40535 \quad 0.40000 \quad 0.40000 \quad 0.40406 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 0.40000 \quad 
    THE ORIGINAL OBJECTIVE FUNCTION = 1357.7404785
    THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4146046
    THE TOTAL OPTIMAL WEIGHT = 2.34472696E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
        X (
                         0.4146E+00
          0.0
       -1.0 +
                                                                                           1.20 1.30 1.40 1.50 1.60 TIME ( X 0.000E+00 )
                                                                                                                                                                                                                                                 1.60
                      1.00 1.10
                                                                                                                                                                                                                                                                                             1.70 1.80 1.90 2.00
                                             OPTIMAL STRUCTURES OF TPS FOR PATCH =
    (WITH AVERAGE THICKNESS)
                                                                                                                                                                                                           0 11174 in 506 2 F
                                                                        HRST COAT
                                                                                                                                            slah
    _____
                               0.12000 in. ALUMINUM 7075-T6
                                                                i_ 0.09500 in.
                                                                i ALUMINUM 7075-T6
                    i i i i i i cell = 0.30000 in.
      i
                                                                                                                                        honey comb
                                                                                                                                                                                                              0.30079 in. 325.9 F
                               0.11000 in. ALUMINUM 7075-T6
    _____
                            0.08000 in. INCONEL 617
            0.08000 in. INCOMEL 01/

v v ___ 0.12000 in.
v v v v TITANIUM (6AL-4V)
v v v v v
v v pitch = 0.80000 in.
                                                                                                                                           corrugated 0.40106 in. 325.1 F
                                 0.08000 in. INCONEL 617
    ______
                                                                         ALUMINUM 2024-T4
                                                                                                                                            slab
                                                                                                                                                                                                              0.10000 in. 300.1 F
                               THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
          PANEL LAYER01
                                                                                                    LAYER02
                                                                                                                                                                     LAYER03
                                                                                                                                                                                                                                     LAYER04
                                                                       405.67
                                                                                                                                       350.33
                                                                                                                                                                                                        303.14
                870
                                   0.08000
                                                                                                   0.30000
                                                                                                                                                                     0.40000
                                                                                                                                                                                                                                     0.10000
                 871
                                   0.08000
                                                                     388.41
365.17
                                                                                                   0.30000
                                                                                                                                      343.17
330.91
                                                                                                                                                                     0.40000
                                                                                                                                                                                                        302.95
298.44
                                                                                                                                                                                                                                     0.10000
                                                                                                                                                                                                                                                                        289.14
                                                                                                   0.30000
                                                                                                                                                                     0.40000
                                                                                                                                                                                                                                                                        284.75
                                   0.08000
                                                                                                                                                                                                                                     0.10000
                                                                336.87 0.30000
312.79 0.30012
277.95 0.30009
253.70 0.30000
                                                                                                                                      312.26
288.30
                                                                                                                                                                                                        286.91
268.19
                                                                                                                                                                                                                                                                        273.71
255.73
                 873
                                   0.08000
                                                                                                                                                                     0.40000
                                                                                                                                                                                                                                     0.10000
                                   0.08509
                874
                                                                                                                                                               0.40016
                                                                                                                                                                                                                                     0.10000
                                   0.08401
                                                                                                                                        258.10
                                                                                                                                                                     0.40013
                                                                                                                                  258.10 0.300_
237.16 0.40000
                                                                                                                                                                                                                                                                   210.15
                                  0.08000
```

220.13 0.10000

876

```
910
           0.08000
                      365.19
                                0.30000
                                            343.39
                                                     0.40000
                                                                 320.86
                                                                           0.10000
                                                                                       300.33
     911
           0.14962
                       428.86
                                0.30169
                                            350.33
                                                      0.40226
                                                                 325.47
                                                                           0.10000
                                                                                       300.33
     912
           0 21294
                       491.88
                                0.30324
                                            350.33
                                                      0.40432
                                                                 325 47
                                                                           0 10000
                                                                                       300 33
           0.24428
                                                      0.40535
                                                                                       300.33
     913
                       506.20
                                0.30401
                                            350.33
                                                                  324.19
                                                                           0.10000
     914
           0.22484
                       463.17
                                0.30354
                                            325.25
                                                      0.40472
                                                                 301.10
                                                                           0.10000
                                                                                       280.54
           0.15476
                                            284.67
                                                      0.40244
                                                                           0.10000
     915
                       363.28
                                0.30183
                                                                 264.33
                                                                                       249.76
     916
           0.08000
                       263.89
                                0.30000
                                            248.06
                                                      0.40000
                                                                  231.76
                                                                           0.10000
                                                                                       222.71
     950
           0.08000
                       470.10
                                0.30000
                                            350.33
                                                      0.40000
                                                                 299.29
                                                                           0.10000
                                                                                       283.94
     951
           0.11485
                       422.38
                                0.30093
                                            343.98
                                                      0.40124
                                                                  304.10
                                                                           0.10000
                       389.77
393.46
     952
           0.16004
                                0.30210
                                            348.67
                                                      0.40279
                                                                 321.02
                                                                           0.10000
                                                                                       297.83
                                            350.32
                                                                                       300.33
     953
           0.19839
                                0.30304
                                                      0.40405
                                                                  325.46
                                                                           0.10000
                                                                 309.72
279.76
     954
           0.18453
                       381.63
                                0.30268
                                            341.83
                                                      0.40358
                                                                           0.10000
                                                                                       287.61
     955
           0.13386
                       379.22
                                0.30138
                                            328.87
                                                      0.40184
                                                                           0.10000
                                                                                       264.53
     956
           0.08000
                       384.38
                                0.30000
                                            318.41
                                                      0.40000
                                                                  252.03
                                                                           0.10000
     990
           0.08000
                       269.03
                                0.30000
                                            257.08
                                                      0.40000
                                                                  244.84
                                                                           0.10000
                                                                                       236.88
           0.08000
                       287.34
                                 0.30000
                                            270.65
                                                      0.40000
                                                                  253.47
                                                                           0.10000
     991
                                                                                       244.50
     992
           0.08000
                       302.70
                                0.30000
                                            281.94
                                                      0.40000
                                                                 260.51
                                                                           0.10000
                                                                                       250.63
           0.08000
                       308.72
                                0.30000
                                            286.15
                                                      0.40000
                                                                 262.82
                                                                           0.10000
     993
                                                                                       252.41
                                                                 258.24
246.73
     994
           0.08000
                       300.90
                                 0.30000
                                            279.93
                                                      0.40000
                                                                           0.10000
                                                                                       247.93
     995
           0.08000
                       279.09
                                0.30000
                                            263.18
                                                      0.40000
                                                                           0.10000
                                                                                       237.17
           0.08000
                       256.77
                                0.30000
                                                      0.40000
                                                                  235.20
                                                                           0.10000
                     OPTIMIZATION SYSTEM FOR TPSSYM = 10
 TOTAL NUMBER OF DESIGN VARIABLES =
 TOTAL NUMBER OF CONSTRAINS = 1344
TOTAL NUMBER OF TEMP. CONSTRAINS = 594
                                   = 1344
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.7390E+03
1.0 B
                   В
                                В
                                             В
                   D
                                D
F
                                                                      D
                                                                                                             В
                                                                                                             D
   0.0
  -1.0 +
       10
                   .20
                              .30
                                             40
                                                          .50
                                                                       60
                                                                                   7.0
                                                                                                .80
                                                                                                            .90
                                                                                                                       1 00
                                                                                                                                    1 10
                                                                TIME ( X 1.401E-44 )
               MAXIMUM TEMPERATURE OF EVERY LAYER
       1 2 3 4 5
2300.33 2020.33 1800.33 2020.33 550.33
738.99 738.99 350.96 350.96 296.45
LAYER:
                                                         300.33
Tmax:
Optv:
                                                       296.45
                     VALUES OF DESIGN VARIABLES :
LAYER
        DEV01
               DEV02 DEV03 DEV04 DEV05 0.16549 0.05000 0.15318 0.22170
                                                         DEV06
                                                                           DEV08
                                                                                     DEV09
                                                                  DEV07
                                                                         0.06563
                                                                                   0.06392
       0.09460
                                                      0.17325
                                                                0.05000
      0 11396
                0 13766
                          0.08000
                                   0.14082
                                            0.13967
                                                      0.15177
                                                                0 16372
                                                                         0 16463
                                                                                   0.08000
                1.02691
                          1.00000 1.00000 1.00000
                                                      1.03522
      1.02025
                                                                1.00000
                                                                          1.00000
      \begin{array}{ccccccccc} 0.05000 & 0.10737 & 0.05000 & 0.07784 & 0.15291 \\ 0.10929 & 0.07403 & 0.05000 & 0.07269 & 0.06720 \end{array}
                                                      0.09079
0.06555
                                                               0.06525
0.05000
                                                                          0.06200
                                                                                   0.05000
                                                                         0.05000
                                                                                   0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                       293.9654846
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.9512293
THE TOTAL OPTIMAL WEIGHT = 8.93290402E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1104E+01
   1.0
                                    A A AA AA A A
         AA A
```

```
-1.0 +
                                                           .51 .61
TIME ( X 1.121E-43 )
                                                                                          .71
     .01
               .11
                              .21
                                          .31
                                                                                                      .81
                                                                                                                  .91
                                                                                                                            1.01
            OPTIMAL STRUCTURES OF TPS FOR PATCH =
                     (WITH AVERAGE THICKNESS)
0.11533 in.
                                          thin skin
______
                                                               -----
i
                     AB312 Fabric
                                           slab
                                                               0.13028 in.
                                                                             739.0 F
                                                               i
Q-Felt(3.5 PCF) thin skin
                                                               1.00949 in. 351.0 F
                                                                 i
                     AB312 Fabric
                                          slab
                                                               0.07848 in. 351.0 F
_____
                                                               0.06544 in.
                                                               ----
_____
                                        slab
                     ALUMINUM 2024-T4
                                                               0.15000 in. 296.4 F
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                              1.0
 PANET.
         TAYER01
                             LAYER02
                                                  LAYERO3
                                                                      LAYER04
                                                                                          LAYER05
                                                                                                              LAYERO6
         0.06392
                     464.58
                                         464.58
                                                             386.17
                                                                                 307.75
                                                                                                     295.47
                                                                                                                          283.19
  1030
                             0.08000
                                                  1.00000
                                                                      0.05000
                                                                                          0.05000
                                                                                                              0.15000
  1031
         0.07003
                    560.77
                             0.11244
                                         560.77
                                                  1.00073
                                                             441.13
                                                                      0.05617
                                                                                 321.48
                                                                                          0.05050
                                                                                                     303.45
                                                                                                              0 15000
                                                                                                                          285.42
  1032
         0.06928
                     659.76
                             0.14132
                                         659.76
                                                  1.00015
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                                                                                                       195.65
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                                                                                                                            171 76
1474
       0.16392
                   331.89
                            0.13900
                                        331.89
                                                 1.02833
                                                             273.32
                                                                      0.10252
                                                                                  214.74
                                                                                           0.08290
                                                                                                       192.18
                                                                                                                0.15000
                                                                                                                            169.61
1475
       0.14306
                   337.42
                            0.13233
                                        337.42
                                                 1.02663
                                                             274.82
                                                                      0.08509
                                                                                  212.21
                                                                                           0.09452
                                                                                                       193.41
                                                                                                                0.15000
                                                                                                                            174.61
1476
       0.09460
                   355.46
                            0.11396
                                        355.46
                                                 1.02025
                                                             284.41
                                                                      0.05000
                                                                                  213.36
                                                                                           0.10929
                                                                                                       201.72
                                                                                                                0.15000
                                                                                                                            190.09
```

TOTAL NUMBER OF DESIGN VARIABLES = 30
TOTAL NUMBER OF CONSTRAINS = 1198
TOTAL NUMBER OF TEMP. CONSTRAINS = 858
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.3950E+03 1.0 B В В В D F D D Α F 0 0 -1.0 -.10 .20 .30 .40 .50 .80 .90 1.00 1.10 TIME (X 1.401E-44)

VALUES OF DESIGN VARIABLES : DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.08000 0.08000 0.08000 0.08000 0.08000 0.08000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 5 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 139.8500061

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006

THE TOTAL OPTIMAL WEIGHT = 3.41962291E+05

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.5028E+00 1.0 A

```
0.0
 -1.0
     1.00
                                                   1.40 1.50 1.60
TIME ( X 0.000E+00 )
                 1.10
                                         1.30
                                                                                                                  1.90
                                                                                                                            2.00
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
HRSI COAT thin skin
                                                               0.05000 in. 395.0 F
                                                                 i
                     AB312 Fabric
                                          slab
                                                               0.08000 in. 395.0 F
_____
                                                               1.00000 in. 287.2 F
                                                               ----
AB312 Fabric
                                          slab
                                                               0.05000 in. 287.2 F
                                                               i
RTV-560 thin skin
                                                               0.05000 in. 255.7 F
                     ALUMINUM 2024-T4
                                                               0.15000 in. 255.7 F
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
 PANEL
                              LAYER02
                                                                      LAYER04
                                                                                          LAYER05
                                                                                                              LAYER06
         LAYER01
                                                  LAYER03
    517
         0.05000
                    185.54
                              0.08000
                                         185.54
                                                 1.00000
                                                             158.19
                                                                      0.05000
                                                                                 130.84
128.78
                                                                                          0.05000
                                                                                                     119.88
                                                                                                              0.15000
                                                                                                                         108.92
                                                                                                              0.15000
         0.05000
                    184.12
                             0.08000
                                                                                                     117.96
    518
                                         184.12
                                                             156.45
                                                                                                                         107.15
    519
          0.05000
                    183.00
                             0.08000
                                         183.00
                                                  1.00000
                                                             154.96
                                                                      0.05000
                                                                                 126.92
                                                                                          0.05000
                                                                                                     116.24
                                                                                                              0.15000
                                                                                                                         105.57
    520
         0.05000
                    181 66
                             0.08000
                                         181 66
                                                  1 00000
                                                             153 32
                                                                      0.05000
                                                                                 124 98
                                                                                          0.05000
                                                                                                     114 49
                                                                                                              0 15000
                                                                                                                         104 01
    557
         0.05000
                    181.66
                             0.08000
                                         179.99
                                                  1.00000
                                                             153.39
                                                                      0.05000
                                                                                 126.79
                                                                                          0.05000
                                                                                                     115.55
                                                                                                              0.15000
    558
         0.05000
                    181.66
                             0.08000
                                         181.18
                                                  1.00000
                                                             153.53
                                                                      0.05000
                                                                                 125.87
                                                                                          0.05000
                                                                                                     114.83
                                                                                                              0 15000
                                                                                                                         104 01
         0.05000
                    182.46
                              0.08000
                                         182.46
                                                  1.00000
                                                             153.74
                                                                      0.05000
                                                                                 125.02
                                                                                          0.05000
                                                                                                     114.16
                                                                                                              0.15000
                                                                                                                         104.01
    559
    560
         0.05000
                    183.87
                             0.08000
                                         183 87
                                                  1 00000
                                                             154.01
                                                                      0.05000
                                                                                 124.15
                                                                                          0.05000
                                                                                                     113.54
                                                                                                              0 15000
                                                                                                                         104 01
         0.05000
                    181.66
                             0.08000
                                                  1.00000
                                                             148.76
                                                                      0.05000
                                                                                 122.92
                                                                                          0.05000
                                                                                                              0.15000
    597
                                         174.61
                                                                                                     111.21
                                                                                                                         104.01
    598
          0.05000
                    181.66
                              0.08000
                                         179.02
                                                  1.00000
                                                             151.11
                                                                      0.05000
                                                                                 123.20
                                                                                          0.05000
                                                                                                     111.75
                                                                                                              0.15000
                                                                                                                         104.01
    599
         0.05000
                    183.39
                             0.08000
                                         183.39
                                                  1.00000
                                                             153.43
                                                                      0.05000
                                                                                 123.47
                                                                                          0.05000
                                                                                                     112.27
                                                                                                              0.15000
                                                                                                                         104.01
    600
         0.05000
                    188.38
                             0.08000
                                         188.38
                                                  1.00000
                                                             156.09
                                                                      0.05000
                                                                                 123.80
                                                                                          0.05000
                                                                                                     112.92
                                                                                                              0.15000
                                                                                                                         104.01
    637
         0.05000
                    181.66
                             0.08000
                                         177.05
                                                  1 00000
                                                             150 92
                                                                      0.05000
                                                                                 124 80
                                                                                          0.05000
                                                                                                     112 37
                                                                                                              0 15000
                                                                                                                         104 01
         0.05000
                    183.43
                             0.08000
                                         183.43
                                                  1.00000
                                                             154.32
                                                                      0.05000
                                                                                 125.22
                                                                                          0.05000
                                                                                                              0.15000
                                                                                                     113.09
                                                                                                                         104.01
    638
         0.05000
                    189.93
                              0.08000
                                         189.93
                                                  1.00000
                                                             157.83
                                                                      0.05000
                                                                                 125.72
                                                                                          0.05000
                                                                                                     113.89
                                                                                                              0.15000
    639
                                                                                                                         104.01
                    197.44
200.08
                                         197.44
                                                             161.82
                                                                      0.05000
                                                                                 126.20
                                                                                          0.05000
    640
         0.05000
                             0.08000
                                                  1.00000
                                                                                                     114.73
                                                                                                              0.15000
                                                                                                                         104.01
    677
          0.05000
                              0.08000
                                         200.08
                                                  1.00000
                                                                      0.05000
                                                                                 142.21
                                                                                          0.05000
                                                                                                     128.85
                                                                                                              0.15000
                                                                                                                         115.50
    678
         0.05000
                    203.59
207.87
                              0.08000
                                         203.59
                                                  1.00000
                                                             171.64
                                                                      0.05000
                                                                                 139.69
                                                                                          0.05000
                                                                                                     126.59
                                                                                                              0.15000
                                                                                                                         113.50
                                                             172.73
                                         207.87
                                                                                          0.05000
                                                                                                     124.75
          0.05000
                              0.08000
                                                  1.00000
                                                                      0.05000
                                                                                 137.59
                                                                                                              0.15000
                                                                                                                         111.91
                                                             173.85
212.27
    680
         0.05000
                    212.75
                              0.08000
                                         212.75
                                                  1.00000
                                                                      0.05000
                                                                                 134.96
                                                                                          0.05000
                                                                                                     122.42
                                                                                                              0 15000
                                                                                                                         109.89
                                         247.91
                    247.91
                                                  1.00000
                                                                      0.05000
                                                                                 176.63
                                                                                          0.05000
                                                                                                     162.37
                                                                                                              0.15000
    717
         0.05000
                              0.08000
                                                                                                                         148.11
    718
         0.05000
                    242.04
                              0.08000
                                         242.04
                                                  1.00000
                                                             204.88
                                                                      0.05000
                                                                                 167.73
                                                                                          0.05000
                                                                                                     153.57
                                                                                                              0.15000
                                                                                                                         139.42
    719
         0.05000
                    237.63
                             0.08000
                                         237.63
                                                  1.00000
                                                             198.70
                                                                      0.05000
                                                                                 159.76
                                                                                          0.05000
                                                                                                     145.68
                                                                                                              0.15000
                                                                                                                         131.60
          0.05000
                    232.65
                              0.08000
                                         232.65
                                                  1.00000
                                                             191.70
                                                                      0.05000
                                                                                 150.75
                                                                                          0.05000
                                                                                                     136.76
                                                                                                              0.15000
                                                                                                                         122.76
    757
         0.05000
                    302 19
                              0.08000
                                         302 19
                                                  1 00000
                                                             259 67
                                                                      0.05000
                                                                                 217 15
                                                                                          0.05000
                                                                                                     202 12
                                                                                                              0 15000
                                                                                                                         187 10
                    283.95
    758
         0.05000
                              0.08000
                                         283.95
                                                  1.00000
                                                             241.93
                                                                      0.05000
                                                                                 199.90
                                                                                          0.05000
                                                                                                     184.75
                                                                                                              0.15000
                                                                                                                         169.61
                    268.20
251.82
                             0.08000
                                                  1.00000
                                                             226.38
210.20
                                                                      0.05000
0.05000
                                                                                                                         153.98
137.70
    759
         0.05000
                                         268.20
                                                                                 184.56
                                                                                          0.05000
                                                                                                     169.27
                                                                                                              0.15000
                                                                                          0.05000
         0.05000
                                                                                 168.59
                                                                                                     153.15
                                                                                                              0.15000
    760
                                         251.82
    797
         0.05000
                    349.03
                              0.08000
                                         349.03
                                                  1.00000
                                                             300.83
                                                                      0.05000
                                                                                 252.62
                                                                                          0.05000
                                                                                                     237.13
                                                                                                              0.15000
                                                                                                                         221.65
                    318.55
291.79
    798
         0.05000
                             0.08000
                                         318.55
                                                  1.00000
                                                             272.85
                                                                      0.05000
                                                                                 227.15
                                                                                          0.05000
                                                                                                     211.31
                                                                                                              0.15000
                                                                                                                         195.46
          0.05000
                              0.08000
                                         291.79
                                                  1.00000
                                                             248.20
                                                                      0.05000
                                                                                 204.61
                                                                                          0.05000
                                                                                                     188.42
                                                                                                              0.15000
                                                                                                                         172.22
    800
         0.05000
                    265.92
                              0.08000
                                         265.92
                                                  1.00000
                                                             224.36
                                                                      0.05000
                                                                                 182.80
                                                                                          0.05000
                                                                                                     166.27
                                                                                                              0.15000
                                                                                                                         149.74
    837
         0.05000
                     380.30
                              0.08000
                                         380.30
                                                  1.00000
                                                             328.26
                                                                      0.05000
                                                                                 276.23
                                                                                          0.05000
                                                                                                     260.55
                                                                                                              0.15000
                                                                                                                         244.86
    838
         0.05000
                     341.65
                              0.08000
                                         341.65
                                                  1.00000
                                                             293.53
                                                                      0.05000
                                                                                 245.42
                                                                                          0.05000
                                                                                                     229.19
                                                                                                              0.15000
                                                                                                                         212.96
                                                                                          0.05000
                                                                      0.05000
    839
         0.05000
                     306.64
                              0.08000
                                         306.64
                                                  1.00000
                                                             262.06
                                                                                 217.48
                                                                                                     200.74
                                                                                                              0.15000
                                                                                                                         184.00
    840
          0.05000
                     274.39
                              0.08000
                                         274.39
                                                  1.00000
                                                             233.03
                                                                      0.05000
                                                                                 191.68
                                                                                          0.05000
                                                                                                     174.49
                                                                                                              0.15000
                                                                                                                         157.31
    877
         0.05000
                     394.95
                              0.08000
                                         394.95
                                                  1.00000
                                                             341.09
                                                                      0.05000
                                                                                 287.23
                                                                                          0.05000
                                                                                                     271.48
                                                                                                              0.15000
                                                                                                                         255.73
         0.05000
                     352.31
                              0.08000
                                         352.31
                                                  1.00000
                                                             303.07
                                                                      0.05000
                                                                                 253.83
                                                                                          0.05000
                                                                                                     237.45
                                                                                                              0.15000
                                                                                                                         221.06
    879
         0.05000
                     313 04
                              0.08000
                                         313 04
                                                  1 00000
                                                             268 05
                                                                      0.05000
                                                                                 223 07
                                                                                          0.05000
                                                                                                     206 10
                                                                                                              0 15000
                                                                                                                         189 12
         0.05000
                              0.08000
                                                  1.00000
                                                                      0.05000
                                                                                 195.89
                                                                                          0.05000
                                                                                                     178.40
                                                                                                              0.15000
    880
                     278.34
                                         278.34
                                                             237.11
                                                                                                                         160.90
```

TOTAL NUMBER OF DESIGN VARIABLES = 30
TOTAL NUMBER OF CONSTRAINS = 856
TOTAL NUMBER OF TEMP. CONSTRAINS = 396
TOTAL NUMBER OF TEMP. PRINTOUTS = 11

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.4693E+03
  1.0 B
                  F
                             F
                                                                 D
                                                                             D
                                                                                                    F
  0.0
 -1.0
                .20
                            .30 .40 .50 .60 .70 TIME ( X 1.401E-44 )
      .10
                                                                             .70
                                                                                       .80 .90
                                                                                                              1.00 1.10

        MAXIMUM TEMPERATURE OF EVERY LAYER

        1
        2
        3
        4
        5

        2300.33
        2020.33
        1800.33
        2020.33
        550.33

        469.31
        469.31
        335.77
        335.77
        283.75

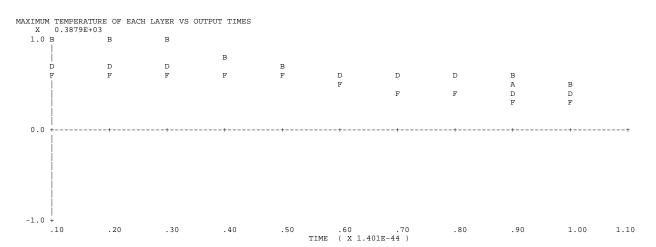
LAYER:
Tmax:
                                                    300.33
Optv:
  VALUES OF DESIGN VARIABLES :

YER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06
1 0.05000 0.05000 0.05000 0.05000 0.05000
2 0.08000 0.08000 0.08000 0.08000 0.08000
LAYER
   1.00000
                                                  0.05000
   5 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                   181.8050079
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028006
THE TOTAL OPTIMAL WEIGHT = 4.49206701E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.5028E+00
  1 0 A
  0.0
  -1.0
                                                    1.40 1.50 1.60
TIME ( X 0.000E+00 )
                 1.10
                        1.20 1.30
                                                                                       1.70 1.80 1.90 2.00
              OPTIMAL STRUCTURES OF TPS FOR PATCH = (WITH AVERAGE THICKNESS)
                                                      12
 HRSI COAT thin skin
                                                              0.05000 in. 469.3 F
 _____
                      AB312 Fabric
                                                              0.08000 in. 469.3 F
                                                                i
      Q-Felt(3.5 PCF) thin skin
                                                              1.00000 in. 335.8 F
                                                              ----
                                                              0.05000 in. 335.8 F
                     AB312 Fabric
                                          slab
                                                              i
-----
 -----
                                                              0.05000 in. 283.7 F
                     RTV-560
                                         thin skin
 -----
                      ALUMINUM 2024-T4
                                          slab
                                                              0.15000 in. 283.7 F
```

	THICKNESS	AND TEMPE	RATURE OF	LAYERS FOR	PATCH =	12						
PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
997	0.05000	469.31	0.08000	469.31	1.00000	402.54	0.05000	335.77	0.05000	309.76	0.15000	283.75
998	0.05000	458.94	0.08000	458.94	1.00000	390.14	0.05000	321.34	0.05000	298.69	0.15000	276.05
999	0.05000	449.62	0.08000	449.62	1.00000	379.00	0.05000	308.37	0.05000	288.75	0.15000	269.13
1000	0.05000	441.24	0.08000	441.24	1.00000	368.98	0.05000	296.72	0.05000	279.82	0.15000	262.91
1037	0.05000	465.14	0.08000	465.14	1.00000	397.97	0.05000	330.80	0.05000	305.70	0.15000	280.61
1037	0.05000	455.83	0.08000	455.83	1.00000	386.87	0.05000	317.91	0.05000	295.80	0.15000	273.69
1038	0.05000	447.20	0.08000	447.20	1.00000	376.57	0.05000	305.95	0.05000	286.62	0.15000	267.28
1040	0.05000	439.02	0.08000	439.02	1.00000	366.84	0.05000	294.66	0.05000	277.93	0.15000	261.21
1077	0.05000	457.48	0.08000	457.48	1.00000	389.65	0.05000	321.82	0.05000	298.33	0.15000	274.83
1077	0.05000	449.45	0.08000	449.45	1.00000	380.19	0.05000	310.93	0.05000	289.89	0.15000	268.86
1079	0.05000	441.92	0.08000	441.92	1.00000	371.28	0.05000	300.65	0.05000	281.96	0.15000	263.26
1080	0.05000	434.54	0.08000	434.54	1.00000	362.53	0.05000	290.52	0.05000	274.15	0.15000	257.78
1117	0.05000	445.43	0.08000	445.43	1.00000	376.76	0.05000	308.08	0.05000	286.92	0.15000	265.75
1118	0.05000	438.99	0.08000	438.99	1.00000	369.35	0.05000	299.72	0.05000	280.34	0.15000	260.96
1119	0.05000	432.84	0.08000	432.84	1.00000	362.23	0.05000	291.62	0.05000	274.00	0.15000	256.39
1120	0.05000	426.52	0.08000	426.52	1.00000	354.84	0.05000	283.17	0.05000	267.43	0.15000	251.68
1157	0.05000	429.59	0.08000	429.59	1.00000	360.12	0.05000	290.65	0.05000	272.25	0.15000	253.86
1158	0.05000	424.60	0.08000	424.60	1.00000	354.66	0.05000	284.72	0.05000	267.44	0.15000	250.16
1159	0.05000	419.73	0.08000	419.73	1.00000	349.28	0.05000	278.83	0.05000	262.69	0.15000	246.54
1160	0.05000	414.39	0.08000	414.39	1.00000	343.33	0.05000	272.26	0.05000	257.42	0.15000	242.58
1197	0.05000	412.61	0.08000	412.61	1.00000	342.62	0.05000	272.62	0.05000	256.91	0.15000	241.20
1198	0.05000	408.60	0.08000	408.60	1.00000	338.59	0.05000	268.58	0.05000	253.43	0.15000	238.29
1199	0.05000	404.70	0.08000	404.70	1.00000	334.65	0.05000	264.60	0.05000	250.02	0.15000	235.45
1200	0.05000	400.22	0.08000	400.22	1.00000	330.08	0.05000	259.93	0.05000	246.06	0.15000	232.18
1237	0.05000	398.92	0.08000	398.92	1.00000	328.81	0.05000	258.71	0.05000	244.90	0.15000	231.08
1238	0.05000	395.37	0.08000	395.37	1.00000	325.62	0.05000	255.87	0.05000	242.26	0.15000	228.64
1239	0.05000	392.04	0.08000	392.04	1.00000	322.62	0.05000	253.20	0.05000	239.77	0.15000	226.35
1240	0.05000	388.14	0.08000	388.14	1.00000	319.08	0.05000	250.02	0.05000	236.83	0.15000	223.65
1277	0.05000	389.86	0.08000	389.86	1.00000	320.11	0.05000	250.36	0.05000	237.43	0.15000	224.50
1278	0.05000	386.76	0.08000	386.76	1.00000	317.55	0.05000	248.34	0.05000	235.44	0.15000	222.53
1279	0.05000	383.86	0.08000	383.86	1.00000	315.17	0.05000	246.47	0.05000	233.58	0.15000	220.70
1280	0.05000	380.48	0.08000	380.48	1.00000	312.38	0.05000	244.27	0.05000	231.41	0.15000	218.55
1317	0.05000	384.91	0.08000	384.91	1.00000	315.63	0.05000	246.35	0.05000	233.66	0.15000	220.97
1318	0.05000	382.01	0.08000	382.01	1.00000	313.36	0.05000	244.71	0.05000	232.00	0.15000	219.28
1319	0.05000	379.39	0.08000	379.39	1.00000	311.31	0.05000	243.23	0.05000	230.50	0.15000	217.76
1320	0.05000	376.31	0.08000	376.31	1.00000	308.90	0.05000	241.48	0.05000	228.72	0.15000	215.96
1357	0.05000	382.23	0.08000	382.23	1.00000	313.37	0.05000	244.51	0.05000	231.81	0.15000	219.11
1358	0.05000	379.52	0.08000	379.52	1.00000	311.30	0.05000	243.07	0.05000	230.35	0.15000	217.64
1359	0.05000	377.06	0.08000	377.06	1.00000	309.41	0.05000	241.76	0.05000	229.03	0.15000	216.31
1360	0.05000	374.12	0.08000	374.12	1.00000	307.15	0.05000	240.19	0.05000	227.45	0.15000	214.70
1397	0.05000	380.58	0.08000	380.58	1.00000	312.07	0.05000	243.56	0.05000	230.77	0.15000	217.98
1398	0.05000	377.97	0.08000	377.97	1.00000	310.09	0.05000	242.21	0.05000	229.43	0.15000	216.65
1399	0.05000	375.55	0.08000	375.55	1.00000	308.25	0.05000	240.95	0.05000	228.18	0.15000	215.41
1400	0.05000	372.62	0.08000	372.62	1.00000	306.02	0.05000	239.41	0.05000	226.66	0.15000	213.90
1437	0.05000	378.99	0.08000	378.99	1.00000	310.94	0.05000	242.90	0.05000	229.91	0.15000	216.93
1438	0.05000	376.47	0.08000	376.47	1.00000	309.03	0.05000	241.59	0.05000	228.66	0.15000	215.73
1439	0.05000	374.03	0.08000	374.03	1.00000	307.17	0.05000	240.31	0.05000	227.44	0.15000	214.57
1440	0.05000	371.05	0.08000	371.05	1.00000	304.90	0.05000	238.75	0.05000	225.95	0.15000	213.15
1477	0.05000	377.67	0.08000	377.67	1.00000	310.18	0.05000	242.69	0.05000	229.39	0.15000	216.09
1478	0.05000	375.21	0.08000	375.21	1.00000	308.29	0.05000	241.37	0.05000	228.19	0.15000	215.02
1479	0.05000	372.74	0.08000	372.74	1.00000	306.38	0.05000	240.03	0.05000	226.99	0.15000	213.94
1480	0.05000	369.69	0.08000	369.69	1.00000	304.04	0.05000	238.39	0.05000	225.50	0.15000	212.62

OPTIMIZATION SYSTEM FOR TPSSYM = 13

TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 1702
TOTAL NUMBER OF TEMP. CONSTRAINS = 792
TOTAL NUMBER OF TEMP. PRINTOUTS = 11



```
LAYER:
      1 2 3 4 5
2300.33 2020.33 1800.33 2020.33 550.33
387.91 387.91 270.21 270.21 236.06
                                                 300.33
236.06
Tmax:
Optv:
                  VALUES OF DESIGN VARIABLES :
                DEV02 DEV03 DEV04 DEV05
                                                  DEV06
   1 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
                                                                         0.05000
   2 0.08000
                                                         0.08000
              0.08000 0.08000 0.08000 0.08000 0.08000
                                                                 0.08000
                                                                          0.08000
              1.00000
                       1.00000
                               1.00000
                                        1.00000
                                                1.00000
      1.00000
                                                         1.00000
                                                                  1.00000
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      0.05000
                                                         0.05000
                                                                  0.05000
                                                                          0.05000
      0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
THE ORIGINAL OBJECTIVE FUNCTION = 349.5949707
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5028266
THE TOTAL OPTIMAL WEIGHT = 3.55799600E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
      0.5028E+00
  0 0
 -1.0 -
                          1.20 1.30 1.40 1.50 1.60 TIME ( X 0.000E+00 )
                                                                      1.60
      1.00
              1.10
                                                                                    1.70
                                                                                                1.80
                                                                                                          1.90
                                                                                                                      2.00
              OPTIMAL STRUCTURES OF TPS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
     _____
                     HRSI COAT
                                                            0.05000 in. 387.9 F
                                        thin skin
                     AB312 Fabric
                                        slab
                                                            0.08000 in. 387.9 F
_____
                                                            0.99994 in. 270.2 F
                     Q-Felt(3.5 PCF) thin skin
----
                                                            0.05000 in. 270.2 F
                     AB312 Fabric
                                        slab
                                                            i
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                    RTV-560
                                                            0.05000 in. 236.1 F
                                    thin skin
                                                            0.15000 in. 236.1 F
                     ALUMINUM 2024-T4
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
                                                                                      LAYER05
                                                                            221.33
196.92
                    302.66
265.96
                            0.08000
                                               1.00000
                                                          261.99
231.44
                                                                  0.05000
     12
          0.05000
                                       302.66
                                                                                     0.05000
                                                                                                208.86
                                                                                                        0.15000
                                                                                                                  196.39
          0.05000
                                       265.96
                                                                                      0.05000
                                                                                                184.68
                                                                                                        0.15000
                                                                                                                   172.44
                                       245.56
238.57
                                                          214.07
207.73
          0.05000
                    245.56
                            0.08000
                                                1.00000
                                                                  0.05000
                                                                             182.57
                                                                                      0.05000
                                                                                                170.45
                                                                                                        0.15000
                                                                                                                   158.33
                    238.57
237.90
     15
          0.05000
                             0.08000
                                                1.00000
                                                                  0.05000
                                                                             176.88
                                                                                      0.05000
                                                                                                164.79
                                                                                                        0.15000
                                                                                                                   152.70
          0.05000
                            0.08000
                                       237.90
                                                1.00000
                                                          206.57
                                                                   0.05000
                                                                                      0.05000
                                                                                                163.14
                                                                                                        0.15000
     52
          0.05000
                    320.99
                            0.08000
                                       320.99
                                                1.00000
                                                          276.19
                                                                  0.05000
                                                                             231.39
                                                                                     0.05000
                                                                                                217.99
190.50
                                                                                                        0.15000
                                                                                                                   204.59
                    275.60
                             0.08000
                                       275.60
                                                0.99994
                                                          239.14
                                                                             202.69
                                                                                      0.05000
     54
          0.05000
                    250.80
                             0 07999
                                       250.80
                                                0.99992
                                                          218 83
                                                                  0.05000
                                                                             186 87
                                                                                      0.05000
                                                                                                175.44
169.12
                                                                                                        0 15000
                                                                                                                   164 01
                                       239.81
          0.05000
                    239.81
                             0.07999
                                                0.99994
                                                          209.97
                                                                   0.05000
                                                                                      0.05000
                                                                                                        0.15000
     55
                                                                             180.13
                                                                                                                   158.11
                    237.90
339.39
                                               1.00000
     56
          0.05000
                            0.08000
                                       235.43
                                                          206.90
                                                                  0.05000
                                                                             178.37
                                                                                     0.05000
                                                                                                167.69
                                                                                                        0.15000
                                                                                                                   157.01
                                                                                                227.26
          0.05000
                             0.08000
                                       339.39
                                                          290.50
                                                                  0.05000
                                                                             241.60
                                                                                      0.05000
                                                                                                        0.15000
                                                                                                                   212.92
     92
     93
          0.05000
                    287.46
                             0.07999
                                       287.46
                                                0.99987
                                                          248.67
                                                                   0.05000
                                                                             209.88
                                                                                      0.05000
                                                                                                197.72
                                                                                                        0.15000
     94
          0.05000
                    258.04
                             0.07999
                                       258.04
                                                0.99983
                                                          225.23
                                                                  0.05000
                                                                             192.42
                                                                                     0.05000
                                                                                                181.63
                                                                                                        0.15000
                                                                                                                   170.85
                    245.22
                             0.07999
                                       245.22
                                                0.99987
                                                          215.56
                                                                             185.90
                                                                                      0.05000
                                                                                                175.92
          0.05000
                                                                   0.05000
                                                                                                        0.15000
                                                                                                                   165.93
     96
          0.05000
                    241.98
                             0.08000
                                       241.98
                                                1.00000
                                                          213.96
                                                                   0.05000
                                                                             185.94
                                                                                      0.05000
                                                                                                176.36
                                                                                                        0.15000
                                                                                                                   166.78
          0.05000
                    356.22
                             0.08000
                                       356.22
                                                1.00000
                                                          303.65
                                                                   0.05000
                                                                                      0.05000
                                                                                                        0.15000
                                                                             251.09
                                                                                                235.88
                                                                                                                   220.66
    132
    133
          0.05000
                    299.34
                             0.07999
                                       299.34
                                                0.99981
                                                          258.27
                                                                   0.05000
                                                                             217.20
                                                                                      0.05000
                                                                                                205.00
                                                                                                        0.15000
                                                                                                                   192.79
          0.05000
                    267.18
                             0.07998
                                       267.18
                                                0.99977
                                                                  0.05000
                                                                             198.99
                                                                                     0.05000
                                                                                                188.65
                                                                                                        0.15000
    134
                                                          233.09
                                                                                                                   178.31
                                                                   0.05000
                                                                                                188.31 0.15000
    136
          0.05000
                    260.63 0.08000
                                       260.63
                                               1.00000
                                                          229.19
                                                                  0.05000
                                                                            197.75
                                                                                     0.05000
                                                                                                                   178.87
```

MAXIMUM TEMPERATURE OF EVERY LAYER

								050 00		040 40		
172	0.05000	370.07	0.08000	370.07	1.00000	314.58	0.05000	259.09	0.05000	243.13	0.15000	227.17
173	0.05000	310.22	0.07998	310.22	0.99977	267.13	0.05000	224.05	0.05000	211.72	0.15000	199.39
174	0.05000	276.96	0.07998	276.96	0.99973	241.29	0.05000	205.63	0.05000	195.43	0.15000	185.24
175	0.05000	269.77	0.07999	269.77	0.99983	236.18	0.05000	202.59	0.05000	193.08	0.15000	183.58
176	0.05000	288.66	0.08000	288.66	1.00000	250.46	0.05000	212.27	0.05000	202.05	0.15000	191.83
212	0.05000	378.80	0.08000	378.80	1.00000	321.56	0.05000	264.32	0.05000	247.85	0.15000	231.38
								229.04				
213	0.05000	317.98	0.07998	317.98	0.99976	273.51	0.05000		0.05000	216.56	0.15000	204.07
214	0.05000	284.46	0.07998	284.46	0.99972	247.49	0.05000	210.52	0.05000	200.25	0.15000	189.98
215	0.05000	282.74	0.07999	282.74	0.99984	246.35	0.05000	209.97	0.05000	200.09	0.15000	190.20
	0.05000											
216		308.95	0.08000	308.95	1.00000	265.45	0.05000	221.94	0.05000	210.90	0.15000	199.86
252	0.05000	382.76	0.08000	382.76	1.00000	324.77	0.05000	266.78	0.05000	250.06	0.15000	233.35
253	0.05000	321.96	0.07998	321.96	0.99975	276.80	0.05000	231.65	0.05000	219.05	0.15000	206.44
254	0.05000	289.11	0.07998	289.11	0.99973	251.29	0.05000	213.47	0.05000	203.09	0.15000	192.72
255	0.05000	289.35	0.07999	289.35	0.99985	251.46	0.05000	213.57	0.05000	203.43	0.15000	193.28
256	0.05000	317.30	0.08000	317.30	1.00000	271.55	0.05000	225.80	0.05000	214.38	0.15000	202.97
292	0.05000	384.84	0.08000	384.84	1.00000	326.48	0.05000	268.12	0.05000	251.27	0.15000	234.42
293	0.05000	324.27	0.07998	324.27	0.99975	278.73	0.05000	233.19	0.05000	220.51	0.15000	207.82
294	0.05000	291.96	0.07998	291.96	0.99973	253.61	0.05000	215.26	0.05000	204.79	0.15000	194.33
295	0.05000	292.97	0.07999	292.97	0.99986	254.24	0.05000	215.51	0.05000	205.20	0.15000	194.89
296	0.05000	321.21	0.08000	321.21	1.00000	274.39	0.05000	227.58	0.05000	215.99	0.15000	204.40
332	0.05000	386.55	0.08000	386.55	1.00000	327.90	0.05000	269.26	0.05000	252.29	0.15000	235.32
333	0.05000	325.69	0.07998	325.69	0.99975	279.91	0.05000	234.13	0.05000	221.40	0.15000	208.66
334	0.05000	294.65	0.07998	294.65	0.99974	255.79	0.05000	216.92	0.05000	206.36	0.15000	195.79
335	0.05000	296.14	0.07999	296.14	0.99987	256.66	0.05000	217.18	0.05000	206.73	0.15000	196.27
336	0.05000	324.15	0.08000	324.15	1.00000	276.53	0.05000	228.92	0.05000	217.19	0.15000	205.46
372	0.05000	387.91	0.08000	387.91	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
373	0.05000	327.76	0.07998	327.76	0.99976	281.66	0.05000	235.56	0.05000	222.74	0.15000	209.92
374	0.05000	297.15	0.07998	297.15	0.99974	257.80	0.05000	218.46	0.05000	207.79	0.15000	197.12
375	0.05000	298.92	0.07999	298.92	0.99987	258.78	0.05000	218.64	0.05000	208.05	0.15000	197.46
376	0.05000	326.44	0.08000	326.44	1.00000	278.20	0.05000	229.95	0.05000	218.11	0.15000	206.28
412	0.05000	387.91	0.08000	387.91	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
413	0.05000	329.59	0.07998	329.59	0.99976	283.22	0.05000	236.84	0.05000	223.94	0.15000	211.04
414	0.05000	299.44	0.07998	299.44	0.99975	259.65	0.05000	219.86	0.05000	209.09	0.15000	198.31
415	0.05000	301.35	0.07999	301.35	0.99988	260.63	0.05000	219.91	0.05000	209.19	0.15000	198.48
416	0.05000	328.27	0.08000	328.27	1.00000	279.52	0.05000	230.78	0.05000	218.85	0.15000	206.93
452	0.05000	387.91	0.08000	387.91	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
453	0.05000	331.94	0.07998	331.94	0.99977	285.24	0.05000	238.53	0.05000	225.50	0.15000	212.47
454	0.05000	302.51	0.07998	302.51	0.99976	262.11	0.05000	221.72	0.05000	210.79	0.15000	199.85
								221.51			0.15000	
455	0.05000	304.44	0.07999	304.44	0.99989	262.97	0.05000		0.05000	210.63		199.75
456	0.05000	330.36	0.08000	330.36	1.00000	281.04	0.05000	231.72	0.05000	219.69	0.15000	207.67
492	0.05000	387.91	0.08000	387.91	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
493	0.05000	334.94	0.07998	334.94	0.99979	287.85	0.05000	240.77	0.05000	227.54	0.15000	214.31
494	0.05000	307.11	0.07998	307.11	0.99978	265.79	0.05000	224.47	0.05000	213.27	0.15000	202.08
495	0.05000	309.08	0.07999	309.08	0.99990	266.48	0.05000	223.89	0.05000	212.75	0.15000	201.62
496	0.05000	333.26	0.08000	333.26	1.00000	283.14	0.05000	233.02	0.05000	220.85	0.15000	208.69
532	0.05000	387.48	0.08000	387.48	1.00000	329.06	0.05000	270.21	0.05000	253.14	0.15000	236.06
533	0.05000	337.35	0.07998	337.35	0.99981	290.02	0.05000	242.70	0.05000	229.25	0.15000	215.79
534	0.05000	311.99	0.07998	311.99	0.99981	269.67	0.05000	227.35	0.05000	215.84	0.15000	204.33
535	0.05000	314.21	0.07999	314.21	0.99991	270.35	0.05000	226.49	0.05000	215.07	0.15000	203.64
536	0.05000	336.34	0.08000	336.34	1.00000	285.37	0.05000	234.40	0.05000	222.08	0.15000	209.76
572	0.05000	384.60	0.08000	384.60	1.00000	327.72	0.05000	270.21	0.05000	253.14	0.15000	236.06
573	0.05000	338.99	0.07999	338.99	0.99983	291.56	0.05000	244.14	0.05000	230.48	0.15000	216.82
574	0.05000	316.51	0.07999	316.51	0.99984	273.25	0.05000	229.99	0.05000	218.15	0.15000	206.32
575	0.05000	319.18	0.07999	319.18	0.99993	274.09	0.05000	228.99	0.05000	217.27	0.15000	205.55
576	0.05000	339.30	0.08000	339.30	1.00000	287.51	0.05000	235.72	0.05000	223.26	0.15000	210.79
		380.81	0.08000	380.81	1.00000	325.09						
612	0.05000						0.05000	269.38	0.05000	252.17	0.15000	234.96
613	0.05000	340.19	0.07999	340.19	0.99986	292.76	0.05000	245.33	0.05000	231.46	0.15000	217.58
614	0.05000	321.01	0.07999	321.01	0.99987	276.80	0.05000	232.58	0.05000	220.40	0.15000	208.21
615	0.05000	324.20	0.08000	324.20	0.99994	277.84	0.05000	231.48	0.05000	219.45	0.15000	207.43
616	0.05000	342.24	0.08000	342.24	1.00000	289.64	0.05000	237.03	0.05000	224.42	0.15000	211.80
652	0.05000	376.28	0.08000	376.28	1.00000	321.89	0.05000	267.51	0.05000	250.42	0.15000	233.34
653	0.05000	340.98	0.07999	340.98	0.99990	293.63	0.05000	246.29	0.05000	232.19	0.15000	218.10
										222.53		
654	0.05000	325.39	0.07999	325.39	0.99990	280.24	0.05000	235.08	0.05000		0.15000	209.98
655	0.05000	329.12	0.08000	329.12	0.99996	281.52	0.05000	233.91	0.05000	221.57	0.15000	209.23
656	0.05000	345.08	0.08000	345.08	1.00000	291.68	0.05000	238.29	0.05000	225.53	0.15000	212.77
692	0.05000	371.11	0.08000	371.11	1.00000	318.20	0.05000	265.29	0.05000	248.36	0.15000	231.44
693	0.05000	341.41	0.07999	341.41	0.99993	294.22	0.05000	247.02	0.05000	232.71	0.15000	218.40
694	0.05000	329.58	0.07999	329.58	0.99993	283.52	0.05000	237.45	0.05000	224.53	0.15000	211.61
695	0.05000	333.88	0.08000	333.88	0.99997	285.06	0.05000	236.24	0.05000	223.59	0.15000	210.94
696	0.05000	347.83	0.08000	347.83	1.00000	293.66	0.05000	239.50	0.05000	226.60	0.15000	213.70
732	0.05000	365.64	0.08000	365.64	1.00000	314.26	0.05000	262.87	0.05000	246.12	0.15000	229.38
733	0.05000	341.50	0.08000	341.50	0.99996	294.52	0.05000	247.54	0.05000	233.03	0.15000	218.51
	0.05000		0.08000		0.99997				0.05000			
734		333.45		333.45		286.53	0.05000	239.62		226.34	0.15000	213.05
735	0.05000	338.29	0.08000	338.29	0.99999	288.34	0.05000	238.39	0.05000	225.44	0.15000	212.50
736	0.05000	350.38	0.08000	350.38	1.00000	295.50	0.05000	240.62	0.05000	227.59	0.15000	214.56
772	0.05000	359.57	0.08000	359.57	1.00000	309.86	0.05000	260.15	0.05000	243.60	0.15000	227.06
773	0.05000	341.34	0.08000	341.34	1.00000	294.63	0.05000	247.92	0.05000	233.19	0.15000	218.47
774	0.05000	337.12	0.08000	337.12	1.00000	289.39	0.05000	241.66	0.05000	228.02	0.15000	214.38
775	0.05000	342.34	0.08000	342.34	1.00000	291.34	0.05000	240.34	0.05000	227.12	0.15000	213.90
776	0.05000	352.72	0.08000	352.72	1.00000	297.18	0.05000	241.65	0.05000	228.50	0.15000	215.35
//0	0.0000	226.14	0.00000	334.14	1.00000	221.10	0.03000	271.US	0.03000	220.00	0.13000	413.33

OPTIMIZATION SYSTEM FOR TPSSYM = 14

```
TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 1254
TOTAL NUMBER OF TEMP. CONSTRAINS = 594
TOTAL NUMBER OF TEMP. PRINTOUTS = 11
```

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.6019E+03 1.0 B

```
В
  0.0
 -1.0 +
              .20
                             .40
     .10
                   .30
                                                .60 .70
TIME ( X 1.401E-44 )
                                                                        .80 .90
                                                                                       1.00
           MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4 5
Tmax: 2300.33 2020.33 1800.33 2020.33 550.33
Optv: 601.94 601.94 377.35 377.35 299.37
                                           300.33
               VALUES OF DESIGN VARIABLES :
   ER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09 1 0.05019 0.05174 0.05280 0.05015 0.05160 0.05231 0.05000 0.05127 0.05177
LAYER
     0.08031 0.08278
                   0.08448 0.08024 0.08255 0.08369
                                                0.08000 0.08203
   3 1.00388 1.03479 1.05602 1.00296 1.03191 1.04613 1.00000
                                                        1.02536
                                                               1.03541
     0.05019 0.05174 0.05280 0.05015 0.05160 0.05231 0.05000
   5 0.05019 0.05174 0.05280 0.05015 0.05160 0.05231 0.05000 0.05127 0.05177
THE ORIGINAL OBJECTIVE FUNCTION =
                              262.2429810
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5173807
THE TOTAL OPTIMAL WEIGHT = 1.53420341E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.5302E+01
  1 0 +
        A A A A A
                                    A
                                                               A
              .15
                                 .35 .45 .55 .65
TIME ( X 2.803E-44 )
                       .25
                                                                        .75
                                                                                 .85
                                                                                          .95
     0.5
                                                                                                   1 05
           OPTIMAL STRUCTURES OF TPS FOR PATCH =
                 (WITH AVERAGE THICKNESS)
 HRSI COAT
                                  thin skin
 _____
                  AB312 Fabric
                                  slab
                                                   0.08210 in. 601.9 F
                                                   i
                                                   1.02631 in. 377.3 F
                 O-Felt(3.5 PCF) thin skin
                  AB312 Fabric
                                                   0.05132 in. 377.3 F
                                                   0.05132 in. 299.4 F
                                                   ----
 _____
                 ALUMINUM 2024-T4 slab
                                                   0.15000 in. 299.4 F
 -----
       THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
```

PANEL	LAYER01		LAYER02		LAYER03		LAYER04		LAYER05		LAYER06	
892	0.05019	502.16	0.08031	502.16	1.00388	408.78	0.05019	315.40	0.05019	296.86	0.15000	278.32
893	0.05099	450.36	0.08158	437.18	1.01973	355.86	0.05099	274.53	0.05099	262.00	0.15000	249.47
894	0.05174	450.36	0.08278	450.36	1.03479	366.58	0.05174	282.81	0.05174	265.63	0.15000	248.44
895	0.05231	513.02	0.08369	513.02	1.04618	417.36	0.05231	321.70	0.05231	294.05	0.15000	266.41
896	0.05280	601.94	0.08448	601.94	1.05602	489.65	0.05280	377.35	0.05280	335.71	0.15000	294.07
932	0.05020	511.98	0.08031	511.98	1.00393	415.99	0.05020	319.99	0.05020	301.01	0.15000	282.03
933	0.05100	457.25	0.08160	457.25	1.01995	371.35	0.05100	285.46	0.05100	271.19	0.15000	256.92
934	0.05173	460.77	0.08277	460.77	1.03468	374.39	0.05173	288.02	0.05173	270.34	0.15000	252.66
935	0.05229	511.54	0.08367	511.54	1.04582	415.78	0.05229	320.02	0.05229	293.20	0.15000	266.38
936	0.05279	597.89	0.08446	597.89	1.05577	486.23	0.05279	374.56	0.05279	333.72	0.15000	292.88
972	0.05020	520.63	0.08031	520.63	1.00393	422.34	0.05020	324.04	0.05020	304.67	0.15000	285.31
973	0.05100	474.30	0.08161	474.30	1.02006	384.52	0.05100	294.75	0.05100	279.01	0.15000	263.27
974	0.05173	470.43	0.08276	470.43	1.03453	381.65	0.05173	292.87	0.05173	274.73	0.15000	256.59
975	0.05227	510.10	0.08363	510.10	1.04543	414.22	0.05227	318.35	0.05227	292.36	0.15000	266.38
976	0.05277	593.24	0.08444	593.24	1.05548	482.30	0.05277	371.36	0.05277	331.44	0.15000	291.51
1012	0.05020	527.77	0.08031	527.77	1.00391	427.58	0.05020	327.38	0.05020	307.70	0.15000	288.02
1013	0.05101	488.52	0.08161	488.52	1.02010	395.51	0.05101	302.50	0.05101	285.54	0.15000	268.58
1013	0.05172	479.33	0.08275	479.33	1.03431	388.34	0.05172	297.34	0.05172	278.77	0.15000	260.30
							0.05225		0.05172			
1015	0.05225	508.66	0.08360	508.66	1.04499	412.66		316.65		291.53	0.15000	266.40
1016	0.05276	587.54	0.08441	587.54	1.05511	477.49	0.05276	367.44	0.05276	328.64	0.15000	289.84
1052	0.05019	534.08	0.08031	534.08	1.00384	432.22	0.05019	330.35	0.05019	310.39	0.15000	290.42
1053	0.05100	501.22	0.08161	501.22	1.02007	405.32	0.05100	309.42	0.05100	291.37	0.15000	273.33
1054	0.05170	487.69	0.08272	487.69	1.03404	394.62	0.05170	301.55	0.05170	282.58	0.15000	263.62
1055	0.05222	507.21	0.08356	507.21	1.04450	411.07	0.05222	314.94	0.05222	290.69	0.15000	266.44
1056	0.05273	580.45	0.08437	580.45	1.05465	471.51	0.05273	362.56	0.05273	325.16	0.15000	287.76
1092	0.05019	539.72	0.08030	539.72	1.00372	436.37	0.05019	333.02	0.05019	312.80	0.15000	292.58
1093	0.05100	512.37	0.08160	512.37	1.01994	413.94	0.05100	315.50	0.05100	296.51	0.15000	277.52
1094	0.05168	495.36	0.08270	495.36	1.03370	400.39	0.05168	305.42	0.05168	286.09	0.15000	266.75
1095	0.05220	505.79	0.08352	505.79	1.04394	409.51	0.05220	313.23	0.05220	289.87	0.15000	266.50
1096	0.05270	571.77	0.08432	571.77	1.05406	464.18	0.05270	356.58	0.05270	320.90	0.15000	285.22
1132	0.05018	544.64	0.08028	544.64	1.00352	440.00	0.05018	335.37	0.05018	314.93	0.15000	294.49
1133	0.05099	521.90	0.08158	521.90	1.01972	421.30	0.05099	320.71	0.05099	300.91	0.15000	281.12
1134	0.05166	502.23	0.08266	502.23	1.03328	405.56	0.05166	308.90	0.05166	289.24	0.15000	269.58
1135	0.05217	504.43	0.08347	504.43	1.04331	408.01	0.05217	311.60	0.05217	289.09	0.15000	266.58
1136	0.05267	561.63	0.08427	561.63	1.05334	455.62	0.05267	349.60	0.05267	315.93	0.15000	282.26
1172	0.05016	548.81	0.08026	548.81	1.00326	443.09	0.05016	337.38	0.05016	316.75	0.15000	296.13
1173	0.05097	529.79	0.08155	529.79	1.01942	427.41	0.05097	325.03	0.05097	304.58	0.15000	284.13
1174	0.05164	508.21	0.08262	508.21	1.03278	410.08	0.05164	311.95	0.05164	292.00	0.15000	272.06
1175	0.05213	503.19	0.08341	503.19	1.04263	406.63	0.05213	310.08	0.05213	288.38	0.15000	266.68
1176	0.05263	550.62	0.08420	550.62	1.05251	446.32	0.05263	342.02	0.05263	310.53	0.15000	279.05
1212	0.05015	552.23	0.08024	552.23	1.00296	445.64	0.05015	339.04	0.05015	318.27	0.15000	297.50
1213	0.05095	536.03	0.08152	536.03	1.01905	432.24	0.05095	328.44	0.05095	307.49	0.15000	286.53
1214	0.05161	513.22	0.08258	513.22	1.03221	413.86	0.05161	314.50	0.05161	294.33	0.15000	274.16
1215	0.05209	502.10	0.08335	502.10	1.04189	405.42	0.05209	308.73	0.05209	287.77	0.15000	266.80
1216	0.05258	539.53	0.08413	539.53	1.05161	436.96	0.05258	334.38	0.05258	305.10	0.15000	275.83
1252	0.05013	554.89	0.08021	554.89	1.00266	447.61	0.05013	340.34	0.05013	319.46	0.15000	298.57
1253	0.05093	540.58	0.08149	540.58	1.01863	435.76	0.05093	330.94	0.05093	309.63	0.15000	288.31
1254	0.05158	517.13	0.08253	517.13	1.03160	416.82	0.05158	316.52	0.05158	296.17	0.15000	275.82
1255	0.05206	501.23	0.08329	501.23	1.04113	404.43	0.05206	307.63	0.05206	287.28	0.15000	266.94
1256	0.05253	529.19	0.08406	529.19	1.05070	428.23	0.05253	327.27	0.05253	300.05	0.15000	272.83
1292	0.05011	557.00	0.08018	557.00	1.00227	449.20	0.05011	341.39	0.05011	320.43	0.15000	299.37
1293	0.05090	543.69	0.08145	543.69	1.01807	438.18	0.05090	332.66	0.05090	311.12	0.15000	289.58
1294	0.05154	520.15	0.08247	520.15	1.03089	419.12	0.05154	318.09	0.05154	297.61	0.15000	277.13
1295	0.05202	500.54	0.08323	500.54	1.04032	403.63	0.05202	306.72	0.05202	286.91	0.15000	267.10
1296	0.05249	519.39	0.08398	519.39	1.04975	419.96	0.05249	320.53	0.05249	295.26	0.15000	270.00
1332	0.05009	558.29	0.08014	558.29	1.00172	450.19	0.05009	342.10	0.05009	321.09	0.15000	299.37
1333	0.05086	544.87	0.08138	544.87	1.01729	439.11	0.05086	333.34	0.05086	311.76	0.15000	290.17
			0.08240	522.28	1.02999							278.12
1334	0.05150	522.28				420.76	0.05150	319.23	0.05150	298.67	0.15000	
1335	0.05196	499.97	0.08314	499.97	1.03928	402.94	0.05196	305.91	0.05196	286.62	0.15000	267.32
1336	0.05243	508.20	0.08388	508.20	1.04851	410.52	0.05243	312.84	0.05243	289.81	0.15000	266.78
1372	0.05006	558.19	0.08009	558.19	1.00113	450.17	0.05006	342.15	0.05006	321.16	0.15000	299.37
1373	0.05082	543.44	0.08131	543.44	1.01642	438.02	0.05082	332.60	0.05082	311.20	0.15000	289.80
1374	0.05144	522.97	0.08231	522.97	1.02883	421.31	0.05144	319.66	0.05144	299.11	0.15000	278.55
1375	0.05188	499.67	0.08301	499.67	1.03764	402.51	0.05188	305.35	0.05188	286.52	0.15000	267.70
1376	0.05231	491.22	0.08369	491.22	1.04613	396.21	0.05231	301.19	0.05231	281.58	0.15000	261.98
1412	0.05003	557.21	0.08005	557.21	1.00060	449.50	0.05003	341.78	0.05003	320.85	0.15000	299.37
1413	0.05078	539.90	0.08124	539.90	1.01551	435.31	0.05078	330.71	0.05078	309.68	0.15000	288.65
1414	0.05136	521.23	0.08218	521.23	1.02726	420.07	0.05136	318.90	0.05136	298.49	0.15000	278.08
1415	0.05130	500.48	0.08279	500.48	1.03486	403.21	0.05174	305.95	0.05174	287.16	0.15000	268.37
1415	0.05174	476.06	0.08279	476.06	1.03486	383.47	0.05174	290.88	0.05174	274.46	0.15000	258.04
					1.04130	448.22						
1452	0.05000	555.40	0.08000	555.40			0.05000	341.04	0.05000	320.20	0.15000	299.37
1453	0.05073	534.55	0.08116	534.55	1.01456	431.20	0.05073	327.84	0.05073	307.34	0.15000	286.83
1454	0.05127	516.16	0.08203	516.16	1.02536	416.32	0.05127	316.48	0.05127	296.40	0.15000	276.31
1455	0.05158	503.03	0.08253	503.03	1.03157	405.81	0.05158	308.59	0.05158	288.89	0.15000	269.18
1456	0.05177	492.55	0.08283	492.55	1.03541	397.50	0.05177	302.46	0.05177	283.12	0.15000	263.79

3.0 Blunt Cone Configuration

- Purpose: To demonstrate the capability of the TPSOPT software system to result in a

varying optimal thickness distribution over a blunt cone surface.

- Input File: - Standard input File: CONE_TPS.INP (Listing 3.1)

- Aerodynamic Database: CFDTABLE.DAT (Listing 3.2)

Geometry File: ZNRGEO.DAT (Binary file)ZONAIR Solution File: FLAOWi (Listing 3.3)

- Output File: - Standard Output File: CONE_TPS.OUT (Listing 3.4)

Vehicle Surface Mesh: CONE.NAS (Figure 3.1)Response surfaces for POD analysis (Figure 3.4)

- C_p and Temperature Plot File: CPTEMP.PLT (Figure 3.5)

- Thickness Distribution Plot File: CONETHICK.PLT (Figure 3.6)

3.1 The Surface Mesh of a Blunt Cone Configuration

A blunt cone configuration is shown in Figure 3.1. The surface mesh is generated by ZONAIR and outputted as a binary file "ZNRGEO.DAT". The ZONAIR model consists of 272 panels and 273 grid points. These panels and grid points are stored in the file "ZNRGEO.DAT" which is used in TPSOPT by specifying the name on the second row of the aerodynamic database (CFDTABLE.DAT) that is imported by the "ASSIGN AEROBASE=" executive control command.

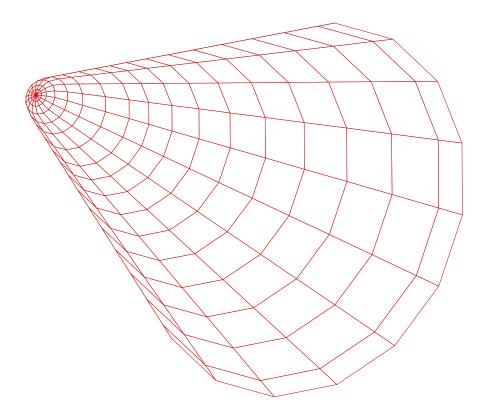


Figure 3.1. Blunt cone surface mesh

3.2 The Aerodynamic Database: CFDTABLE.DAT

The aerodynamic database is generated by running ZONAIR for 55 combinations of 5 Mach numbers (2, 4, 7, 10, 15) and 11 angles of attack (0, 4, 7, 10, 13, 15, 20, 25, 30, 35, 40). This file provides TPSOPT system with all flow field information from ZONAIR. The first row is a title card (CONE); the second row provide the geometry file name (ZNRGEO.DAT); the third and fourth rows list the name of the reference chord, span, ...etc, and their values, respectively; the fifth row lists the names of items in the following rows (Mach number, Altitude, Angle of attack, etc.) and the remaining rows contain the values of the items listed in the fifth row and the file names (FLAOW0001-FLAOW55) in the last column which stores the velocity and pressure coefficients for the 55 combinations of Mach number and Angle of attack listed in the corresponding row.

It is noted that the order of the Mach numbers and angles of attack in the table must be ascending.

3.3 The Standard Input File (CONE_TPS.INP)

The standard input file consists of two major parts: the flow field quantities and the TPS optimization system. The flow field quantities are provided by ZONAIR and imported by the aerodynamic database (CFDTABLE.DAT) using the following statement on the first row:

ASSIGN AEROBASE='CFDTABLE.DAT'

The TPS optimization system is the major portion of the standard input file, which includes specification of trajectory data and definition of patches for the TPS. Four patches are defined for the blunt cone configuration (Figure 3.2), among which patches 1 and 2 are located around the nose of the vehicle and patches 3 and 4 are defined for the body. Figure 3.3 shows individual patches and panel numbers over them.

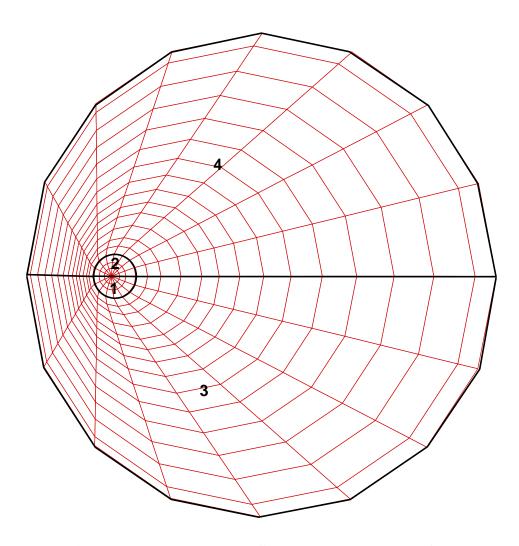
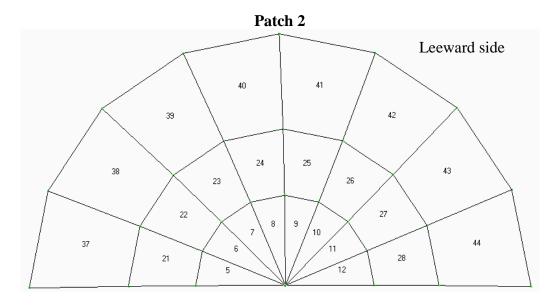
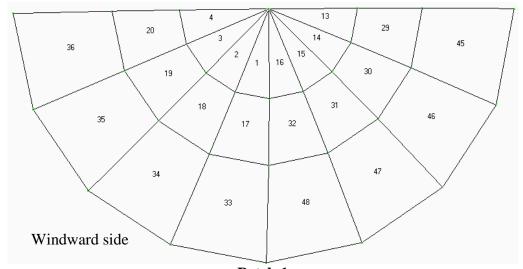
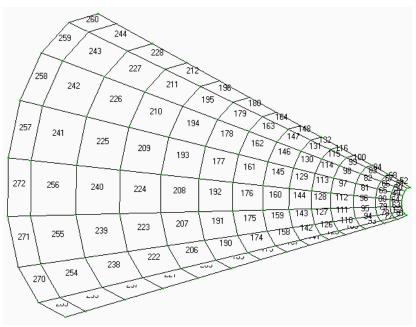


Figure 3.2. Four patches defined over blunt cone surface

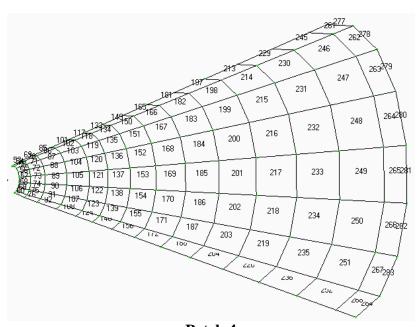




Patch 1



Patch 3



Patch 4

Figure 3.3. Four separated patches defined over the cone surface

3.4 Thermal Structures for Patches

Two sets of 6 layered TPS structures are used for the blunt wedge configuration. The first one is for the nose cap (patches 1 and 2) and the windward surface (patch 3), and the second one for the Leeward surface (patch 4).

The thermal structures specified for the first set TPS using the STTYPE numbers 1, 2, 3, 4, 5 and 6 are Slab, Slab, Thin skin, Slab, Thin skin and Slab, and the corresponding optimization materials are 508 (RCG Coating), 501 (LI-9000), 245 (RTV-560), 313 (5.4LB SIP), 245 (RTV-560) and 103 (Aluminum). The maximum temperatures for these materials are: $2760 \, ^{0}R$, $2860 \, ^{0}R$, $1010 \, ^{0}R$, $910 \, ^{0}R$, $1010 \, ^{0}R$, and $810 \, ^{0}R$. The following is a schematic plot of this TPS.

	HRSI COAT	thin skin
	AB312 Fabric	slab
	Q-Felt(3.5 PCF)	slab
=======================================	AB312 Fabric	slab
	RTV-560	thin skin
	ALUMINUM 7075-T6	slab
=======================================	=============	===========

The structures specified for the second set TPS is the AFRSI (Advanced Flexible Reusable Surface Insulation) TPS which consists of 6 layers: Thin skin, Slab, Slab, Slab, Thin skin and Slab denoted by the STTYPE numbers 31, 32, 33, 34, 35 and 36. The corresponding optimization materials are 221 (HRSI COAT), 266 (AB312 Fabric), 260 (Q-Felt), 266 (AB312 Fabric), 245 (RTV-560) and 103 (Aluminum) and the maximum temperatures for these materials are: $2760^{\circ}R$, $2480^{\circ}R$, $2480^{\circ}R$, $2260^{\circ}R$, and $810^{\circ}R$. The following is a schematic plot of this TPS.

============		==========
	RCG COATING	slab
	L1900	slab
	RTV-560	thin skin
	5.4 LB SIP	slab
	RTV-560	thin skin
	ALUMINUM 7075-T6	slab

The sixth layer of both sets of TPS is defined as the structure layer, which means that the thickness of the sixth layer is constant during the computation of optimization.

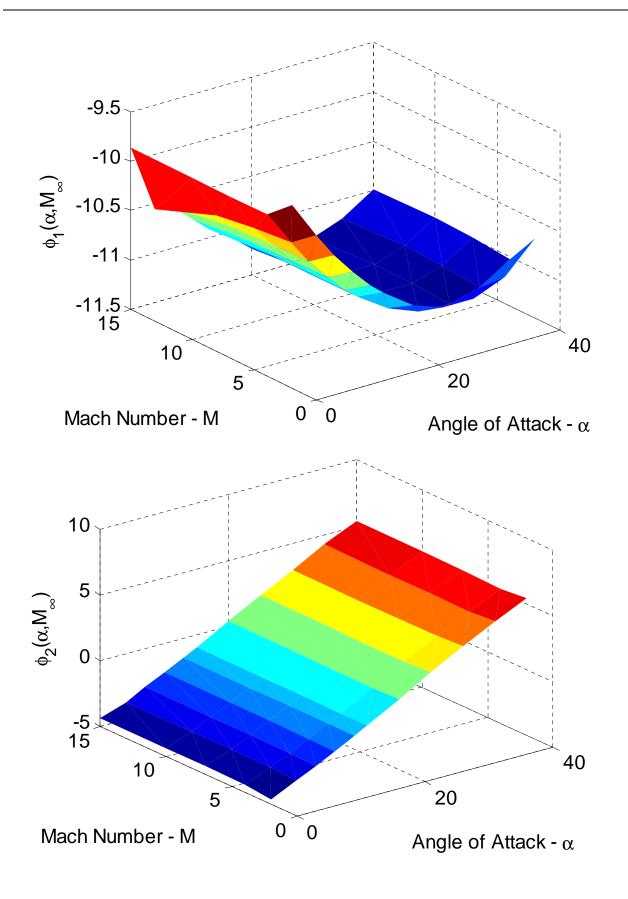
3.5 Output Information

The output information consists of the following items:

- (1) Response surfaces of C_p and velocities for POD analysis (Plot files).
- (2) C_p and temperature for specified times in trajectory bulk data cards (Plot files).
- (3) Schematic text plotting of trajectory-related thermal thantities versus time over every patch. These quantities include enthalpy-based heat transfer coefficient, adiabatic wall enthalpy, and pressure.
- (4) Thickness of every design layer and the ratio of the objective functions between the optimal and initial thickness.
- (5) Schematic text plotting of optimal thickness and maximum temperature over each layer for every patch.
- (6) Optimal thickness and temperature over each layer for every panel (Plot file).

3.6 Results

The output items listed in Section 3.5 have been stored in a text file and some plotting files. The text file is the Standard Output File (CONE_TPS.OUT) which includes all the input information appearing in the Standard Input File (CONE_TPS.INP) and items (3)-(5) listed in the above section. Figures 3.4-3.6 show the response surfaces of C_p, C_p and temperature specified in trajectory bulk data card, and the optimal thickness, respectively.



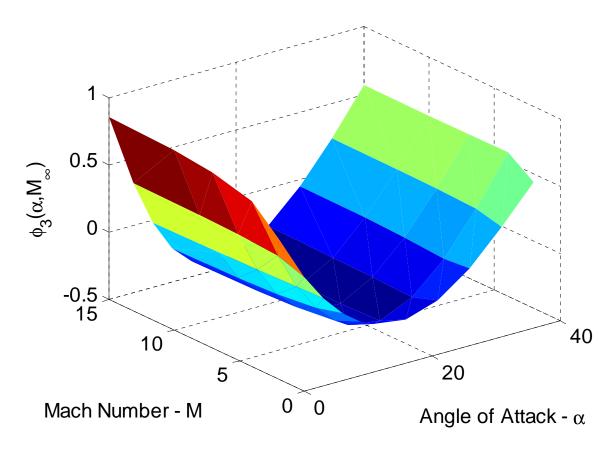


Figure 3.4. Response surface of first three modes for POD analysis

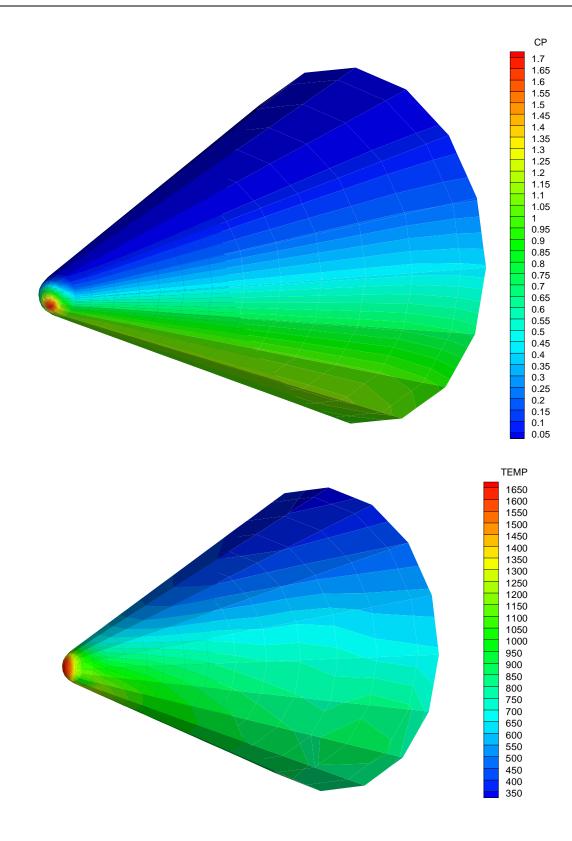
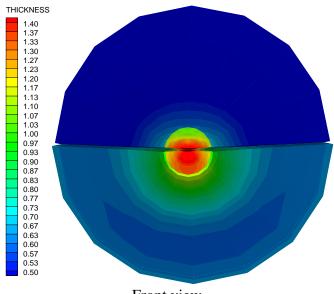
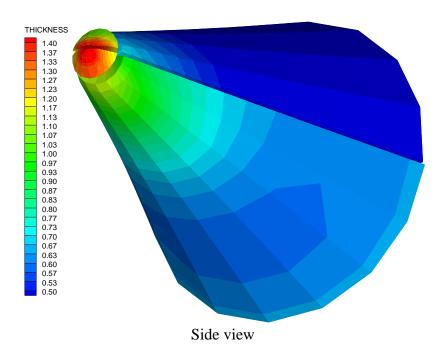


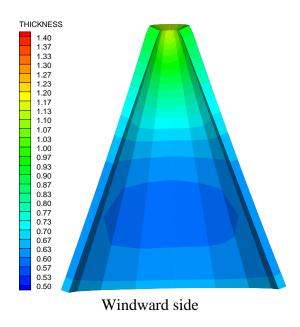
Figure 3.5. Plots of Cp and temperature at time=263 with M=8.4, AoA=30



Front view



3-11



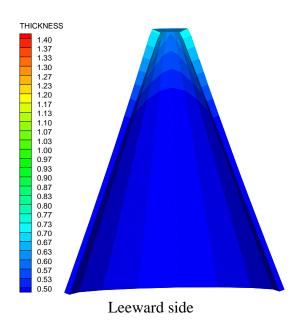


Figure 3.6. Optimal thickness plot

3.7 Lists of Input and Output Files

• Input Data Listing:

Listing 3.1 Standard input File: CONE_TPS.INP

```
ASSIGN AEROBASE='CFDTABLE.DAT', PRINT=0
SOL 1
$ Begin Executive Control Section
CEND
ECHO = SORT
SUBCASE = 1
        SUBTITLE=BLENT-NOSE CONE WITH 20 DEG NOSE ANGLE
        LABEL= HYPERSONIC AERODYNAMIC DATABASE BY ZONAIR
        TPSDES=1
$
BEGIN BULK
               YES
PLTAERO 1
                        NΟ
                                        NASTRAN AEROMESH NAS
$ POLTTING TPS THICKNESS
PLTTPS -1 1
                                TECPLOT CONE1L.PLT
                     ALL
PLTTPS 2
                1
                                TECPLOT CONEML.PLT
                                                          0.05
$PODRSM | TPSDES | METHOD | NRDMOD | TOLER | NEURON | SAVE
                                                         FILENM
                                                         CONEM1.RST
                                                                         CONT
                                                 SAVE
       CPPODRSM.P3D
                        UPODRSM.P3D
CONT
                                         VPODRSM.P3D
                                                         WPODRSM.P3D
                        TRJLST IFPREH IDFEM/TPSSYM
STPSDES SETID
                PODRSM
TPSDES 1
                1
                        1
                                1
                                                                         CONT
                        3
                                4
CONT
$TPSSYM SETID
                IDPATCH NLAYER PRVAL
TPSSYM 1
                        6
                                                                         CONT
               1
CONT
                        0.008
                                                                         CONT
CONT
                 2
                                4.0
                                                                         CONT
        1
                        0.5
CONT
                 3
                        0.01
                                0.1
                                                                         CONT
CONT
                 4
                        0.015
                                0.2
                                                                         CONT
        1
CONT
        1
                 5
                        0.01
                                0.1
                                                                         CONT
CONT
        0
                 6
                        0.02
                                0.2
TPSSYM 2
                 2
                        6
                                                                         CONT
CONT
        2
                 1
                        0.008
                                0.05
                                                                         CONT
        2
                 2
                        0.5
                                4.0
CONT
                                                                         CONT
CONT
        2
                 3
                        0.01
                                0.1
                                                                         CONT
CONT
        2
                 4
                        0.015
                                0.2
                                                                         CONT
CONT
        2
                 5
                        0.01
                                0.1
                                                                         CONT
CONT
        0
                 6
                        0.02
                                0.2
TPSSYM
                                                                         CONT
        3
                 3
                        6
CONT
        3
                        0.008
                                0.05
                                                                         CONT
                 2
CONT
        3
                        0.5
                                4.0
                                                                         CONT
CONT
        3
                 3
                        0.01
                                0.1
                                                                         CONT
CONT
        3
                 4
                        0.015
                                0.2
                                                                         CONT
CONT
        3
                 5
                        0.01
                                0.1
                                                                         CONT
CONT
                 6
                        0.02
                                0.2
TPSSYM 4
                 4
                        6
                                                                         CONT
                 31
                        0.003
                                0.1
                                                                         CONT
CONT
CONT
                 32
                        0.004
                                                                         CONT
        4
                                0.1
CONT
                 33
                        0.2
                                                                         CONT
                                5.0
CONT
        4
                 34
                        0.015
                                1.0
                                                                         CONT
CONT
        4
                 35
                        0.005
                                0.8
                                                                         CONT
CONT
                 36
                        0.01
                                1.0
     TILE TPS (Based on First of Fig10 of Chiu adn Pitts paper, 1991)
                        508
                                                                         CONT
STTYPE 1
                 1
CONT
        0.01
```

STTYPE	2	1	501						CONT	
CONT STTYPE	1.0	6	245						CONT	
CONT STTYPE	0.03	l 1	313						CONT	
CONT	0.05		245							
STTYPE CONT	0.0	L							CONT	
STTYPE CONT	6 0.1	1	103						CONT	
\$ AFRS: STTYPE	I TPS 31	3 (Based o	n Fig7 o 221	of Myers	report,	2000)			CONT	
CONT STTYPE	0.05	5 1	266						CONT	
CONT STTYPE	0.05	5 1	260						CONT	
CONT STTYPE	1.2	1	266						CONT	
CONT	0.2									
STTYPE CONT	35 0.3	6	245						CONT	
STTYPE CONT	36 0.2	1	103						CONT	
\$ PRVAL	4		30000	0000						
\$ \$PATCH	ID	RHSPA	N RHSHO	OT LHSP <i>I</i>	AN LHSHO	ЭTT				\$
PATCH \$	1	11	12)		<i>7</i>				۲
\$DESVAR		NE	ME 4						CONTE	
DESVAR CONT	1 4	3 20	4 36						CONT CONT	
CONT	2	18	34						CONT	
CONT	15	31	47						CONT	
CONT \$	13 IE1	29 IE2	45 IE3	IE4	IE5	IE6	IE7	IE8		
PANLST2	1111	11	1113	1	2	3	4	13	14+CON	
+CON		15	16	17	18	19	20	29	30+CON	
+CON +CON		31 47	32 48	33	34	35	36	45	46+CON	
PANLST2		12	40	4	20	36	2	18	34+CON	
+CON \$		15	31	47	13	29	45			
\$										
PATCH \$	2	21	22							
\$DESVAR DESVAR	ID 2	NE 3	ME 4						CONT	
CONT	5	21	37						CONT	
CONT	7	23	39						CONT	
CONT	10	26	42						CONT	
CONT	12	28	44							
\$	IE1	IE2	IE3	IE4	IE5	IE6 7	IE7	IE8	10.000	
PANLST2 +CON		21 11	12	5 21	6 22	23	8 24	9 25	10+CON 26+CON	
+CON		27	28	37	38	39	40	41	42+CON	
+CON		43	44	3 /	50	3,5	10	11	12.001	
PANLST2		22		12	28	44	10	26	42+CON	
+CON		7	23	39	5	21	37			
\$ \$										
PATCH \$	3	31	32							
\$DESVAR		NE	ME						~~	
DESVAR CONT	3 61	3 189	4 269						CONT CONT	
CONT	63	191	209						CONT	
CONT	50	178	258						CONT	
CONT	52	180	260							
PANLST2		31		49	50	51	52	61	62+CON	
+CON		63	64	65	66	67	68	77	78+CON	

```
82
                                           83
            79
+CON
                   80
                             81
                                                      84
                                                               93
                                                                       94+CON
+CON
             95
                      96
                              97
                                      98
                                              99
                                                       100
                                                               109
                                                                        110+CON
+CON
             111
                     112
                              113
                                      114
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                                                       116
                                                               125
                                                                        126+CON
             127
+CON
                     128
                              129
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                                                       132
                                                               141
                                                                        142+CON
+CON
             143
                     144
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+CON
             159
                     160
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                                                                        174+CON
+CON
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+CON
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                                                                        222+CON
+CON
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                                                                        238+CON
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+CON
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+CON
             255
                     256
                              257
                                      258
                                               259
                                                       260
                                                               269
                                                                        270+CON
             271
+CON
                     272
                                                                                   191
PANLST2
                                         61
                                              189
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CONT
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CONT
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$
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PATCH
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$DESVAR ID
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                        ME
DESVAR 4
                3
                                                                           CONT
CONT
                188
                        268
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        60
CONT
        58
                186
                        266
                                                                           CONT
        55
                183
CONT
                        263
                                                                           CONT
CONT
        53
               181
                        261
PANLST2
            41
                               53
                                               55
                                                                57
                                                                         58+CON
                                       54
                                                      56
+CON
            59
                      60
                               69
                                       70
                                               71
                                                        72
                                                                73
                                                                         74+CON
             75
                                              87
+CON
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                              85
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                                                                89
                                                                         90+CON
                                              103
+CON
             91
                     92
                              101
                                      102
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                                                               105
                                                                        106+CON
+CON
             107
                     108
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                                      118
                                              119
                                                       120
                                                               121
                                                                        122+CON
+CON
             123
                     124
                              133
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                                                               137
                                                                       138+CON
+CON
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                                                                       154+CON
+CON
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+CON
             171
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+CON
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                                                                        202+CON
                                                               217
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+CON
             203
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                              213
                                               215
                                                       216
                                                                        218+CON
+CON
             219
                     220
                              229
                                      230
                                               231
                                                       232
                                                               233
                                                                        234+CON
                                              247
                                                               249
+CON
             235
                     236
                              245
                                      246
                                                       248
                                                                        250+CON
+CON
             251
                     252
                              261
                                      262
                                               263
                                                       264
                                                               265
                                                                        266+CON
+CON
             267
                     268
PANLST2
            42
                              53
                                      181
                                               261
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                                                               183
                                                                        263CONT
                     186
                              266
                                       60
                                               188
                                                       268
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$TRJLST SETID
TRITIST 1
                                                                           CONT
CONT
        1
                1.
        TRAJCT FACT
                        TRAJCT FACT
                                         TRAJCT FACT
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                                                          TRAJCT FACT
$
                MACH
                        ALTH
                                AOA
                                         BETA
                                                  FORM
                                                          FILE1 FILE1
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                                                                           CONT
        .16000E2 0.98944.41990E6 14.0000
                                                                           CONT
       .33000E2 1.34826.43688E6 9.4208
.49000E2 1.63429.58196E6 3.6000
CONT
                                                                           CONT
CONT
                                                                           CONT
       .68000E2 2.17754.82141E6 3.6000
CONT
                                                                           CONT
       .88000E2 2.99306.11358E7 3.6000
.10800E3 4.03065.14897E7 3.6000
.12800E3 5.30536.18668E7 3.6000
CONT
                                                                           CONT
CONT
                                                                           CONT
CONT
                                                                           CONT
       .14700E3 7.18387.22489E7 8.7000
                                                                           CONT
CONT
        .16500E3 8.14718.26307E7 10.2250
                                                                           CONT
CONT
        .18500E3 8.48577.29382E7 10.2250
                                                                           CONT
CONT
       .20500E3 8.73075.31108E7 10.2250
                                                                           CONT
CONT
        .22500E3 8.80061.31479E7 10.2250
                                                                           CONT
        .24500E3 8.62765.30495E7 10.2250
CONT
                                                                           CONT
CONT
        .26300E3 8.35804.28476E7 30.0000
                                                 TECPLOT CPTEMP1.PLT
                                                                           CONT
CONT
        .28300E3 7.92715.25083E7 30.0000
                                                                           CONT
        .30300E3 7.42020.20828E7 30.0000
CONT
                                                                           CONT
CONT
        .32300E3 6.98630.17006E7 30.0000
                                                                           CONT
        .34100E3 6.51451.15705E7 17.6576
CONT
                                                                           CONT
```

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CONT
        .35900E3 6.29482.15555E7 11.3822
                                                                          CONT
CONT
                                                                          CONT
        .37900E3 6.12626.15505E7 11.5945
CONT
        .39900E3 5.96248.15405E7 11.6852
                                                                          CONT
        .41900E3 5.80340.15256E7 11.6316
CONT
                                                                          CONT
CONT
        .43900E3 5.64886.15063E7 11.4712
                                                                          CONT
                                                                          CONT
CONT
        .45900E3 5.49856.14827E7 11.2120
CONT
        .47900E3 5.35216.14551E7 10.8676
                                                                          CONT
        .49900E3 5.20938.14237E7 10.4565
                                                                          CONT
CONT
CONT
        .51900E3 5.06993.13890E7 9.9883
                                                                          CONT
CONT
        .53900E3 4.92935.13511E7
                                 9.3991
                                                                          CONT
CONT
        .55900E3 4.78106.13103E7 8.7931
                                                                          CONT
CONT
        .57900E3 4.62119.12670E7
                                  8.2187
                                                                          CONT
        .59900E3 4.44764.12216E7
                                                                          CONT
CONT
        .61900E3 4.25902.11747E7 7.2020
CONT
                                                                          CONT
CONT
        .63900E3 4.05448.11267E7 6.7771
                                                                          CONT
        .65900E3 3.82413.10782E7 6.3472
CONT
                                                                          CONT
CONT
        .67900E3 3.56631.10300E7
                                                                          CONT
CONT
        .69900E3 3.28723.98254E6 5.7202
                                                                          CONT
CONT
        .71759E3 3.00000.93312E6 4.8191
                                                 TECPLOT CPTEMP2.PLT
                                                                          CONT
                                                                          CONT
CONT
        .73600E3 2.68846.87329E6
                                   4.1829
CONT
        .75600E3 2.29065.80146E6
                                  3.4982
                                                                          CONT
        .77600E3 1.86649.72891E6 3.0646
                                                                          CONT
CONT
CONT
        .79600E3 1.47000.66074E6 3.0928
                                                                          CONT
CONT
        .81600E3 1.14676.59940E6
                                   3.3054
                                                                          CONT
CONT
        .83600E3 0.96665.54315E6
                                  3.8323
                                                                          CONT
CONT
        .85600E3 0.86983.48792E6 3.8046
                                                                          CONT
CONT
        .87400E3 0.80178.43914E6
                                   3.9110
                                                                          CONT
CONT
        .89400E3 0.73186.38870E6
                                  3.9359
                                                                          CONT
        .91400E3 0.67432.34157E6 3.9549
CONT
                                                                          CONT
CONT
        .93400E3 0.62713.29712E6 3.9492
                                                                          CONT
CONT
        .95400E3 0.58784.25488E6
                                                                          CONT
CONT
        .97400E3 0.55190.21464E6
                                  3.8498
                                                                          CONT
CONT
        .99400E3 0.51899.17633E6 3.8233
                                                                          CONT
CONT
        .10140E4 0.48941.13984E6
                                   3.8101
                                                                          CONT
CONT
        .10340E4 0.46307.10502E6
                                   3.8009
                                                                          CONT
        .10540E4 0.43975.71741E5
                                                                          CONT
CONT
CONT
                                  3.7718
        .10740E4 0.41915.39891E5
                                                                          CONT
CONT
        .10940E4 0.40098.93915E4
                                   3.7458
Ś
          TIME
                   MACH
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                                                    Р
                                                            0
                                                                     R
$THERMPR | SETID
                TEMP
                        |HOTWALL|TRANS |GAS
                                                 EMMS
                                                                  THERMPR 1
                 100F
ENDDATA
```

Listing 3.2 Control Table File: CFDTABLE.DAT

						00110101	I WOIC I III		10111					
CONE														
ZNRGEO.DAT														
REFC	REFB	REFS	REFX	REFY	REFZ		LENGTH UNIT	MASS UNIT						
2.0622E+01	1.0000E+00	1.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	IN	SLIN						
MACH	H	ALPHA	BETA	PRATE	QRATE	RRATE	CD	CY	CL	CR	CM	CN	FILE	
2.0000E+00	0.0000E+00	0.0000E+00			0.0000E+00	0.0000E+00		3.9853E-07				1.3317E-05F		
4.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				-2.1905E-06		7.3458E-06F		
7.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				-8.2970E-07		8.9297E-06F		
		0.0000E+00					5.4679E+01					6.8477E-06F		
		0.0000E+00					5.4266E+01					8.6641E-06F		
		4.0000E+00					7.3222E+01					7.8704E-04F		
		4.0000E+00		0.0000E+00	0.0000E+00						-1.9172E+01			
		4.0000E+00					5.7720E+01					1.1624E-04F		
		4.0000E+00		0.0000E+00	0.0000E+00	0.0000E+00						4.1108E-04F		
											-2.0469E+01			
		7.0000E+00			0.0000E+00						-3.1974E+01			
		7.0000E+00									-3.3258E+01			
		7.0000E+00			0.0000E+00		6.2002E+01					2.3908E-04F		
		7.0000E+00					6.1167E+01					2.7106E-04F		
1.5000E+01	0.0000E+00	7.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				2.9149E-05	-3.5157E+01	2.6401E-04F	LAOW0015	
		1.0000E+01				0.0000E+00		-1.0924E-04		2.0896E-05		1.2791E-04F	LAOW0016	
		1.0000E+01			0.0000E+00		7.1680E+01					4.8063E-04F		
		1.0000E+01									-4.7776E+01			
		1.0000E+01									-4.8256E+01			
1.5000E+01	0.0000E+00		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-2.8531E-04				6.6047E-04F		
		1.3000E+01					8.7812E+01					2.2920E-03F		
4.0000E+00		1.3000E+01		0.0000E+00	0.0000E+00	0.0000E+00		-3.5613E-04				4.8715E-04F		
		1.3000E+01									-6.0535E+01			
1.0000E+01	0.0000E+00		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00					-6.0775E+01			
		1.3000E+01									-6.1164E+01			
		1.5000E+01			0.0000E+00						-6.8055E+01			
		1.5000E+01									-6.8808E+01			
		1.5000E+01			0.0000E+00	0.0000E+00					-6.8581E+01			
		1.5000E+01					8.3764E+01					3.7604E-03F		
		1.5000E+01									-6.8654E+01			
		2.0000E+01					1.0884E+02					5.6837E-04F		
		2.0000E+01		0.0000E+00	0.0000E+00		1.0638E+02					1.4034E-03F		
		2.0000E+01									-8.7360E+01			
		2.0000E+01									-8.6722E+01			
											-8.6845E+01			
		2.5000E+01									-1.0961E+02			
4.0000E+00		2.5000E+01	0.0000E+00	0.0000E+00	0.0000E+00						-1.0793E+02			
		2.5000E+01			0.0000E+00						-1.0450E+02			
		2.5000E+01									-1.0337E+02			
		2.5000E+01		0.0000E+00	0.0000E+00						-1.0322E+02			
2.0000E+00	0.0000E+00		0.0000E+00		0.0000E+00						-1.2726E+02			
		3.0000E+01									-1.2441E+02			
	0.0000E+00		0.0000E+00	0.0000E+00	0.0000E+00						-1.2004E+02			
											-1.1864E+02			
1.5000E+01		3.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00						-1.1834E+02			
		3.5000E+01									-1.4272E+02			
		3.5000E+01									-1.3811E+02			
		3.5000E+01									-1.3365E+02			
		3.5000E+01			0.0000E+00						-1.3220E+02			
		3.5000E+01									-1.3187E+02			
											-1.5556E+02			
											-1.4870E+02 -1.4465E+02			
											-1.4465E+02			
1.5000E+01	0.0000E+00						1.984/E+02 0000E+00 1				-1.4334E+02 -2.9686E-03			_02=170=00==
T.3000F+0T	0.00005+00	4.000UE+	0.0000	5.000	0E-00 0.00	UUDTUU U.	OOUDTUU I	JUODETUZ	2.2440E-U3	0.023/6+01	-Z.5000E-US	-T.#300F+0	∠ -3.3∠85E	-02LTWOM0022

Listing 3.3 ZONAIR Solution File: FLAOWi

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(Only shows the file:FLOW0001)
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                                                                                                                                                                                                                                              1P,5E16.9
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                                                                                                                              272
    1.287919283E-02 1.289385557E-02 1.289397478E-02 1.287907362E-02 1.287907362E-02
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    1.047056317E-01 1.048370600E-01 1.048373580E-01 1.047066450E-01 1.047066450E-01
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    1.048373580E-01 1.047065854E-01 2.978144288E-01 2.978913188E-01 2.978905439E-01
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     7.406836748E-01 \ \ 7.419244051E-01 \ \ 7.419238091E-01 \ \ 7.406833172E-01 \ \ 7.406834364E-01
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    7.326928377E-01 \ \ 7.326924801E-01 \ \ 7.330884337E-01 \ \ 7.330890298E-01 \ \ 7.326923013E-01
     7.326927185E-01 7.330886722E-01 7.330886722E-01 7.326927185E-01 7.326923013E-01
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    7.302237749E-01 \ \ 7.302243114E-01 \ \ 7.303545475E-01 \ \ 7.303545475E-01 \ \ 7.302243114E-01
    7.302237749{\hbox{\it E}}-01\ \ 7.303547859{\hbox{\it E}}-01\ \ 7.303547859{\hbox{\it E}}-01\ \ 7.302243114{\hbox{\it E}}-01\ \ 7.302240729{\hbox{\it E}}-01
    7.303544283E-01 \ 7.354699373E-01 \ 7.356298566E-01 \ 7.356303930E-01 \ 7.354695201E-01
     7.354699969E-01 \ \ 7.356303930E-01 \ \ 7.356303930E-01 \ \ 7.354699373E-01 \ \ 7.354699374E-01 \ \ 7.35
    7.356303930 \\ \text{E}-01 \ \ 7.356303930 \\ \text{E}-01 \ \ 7.354699969 \\ \text{E}-01 \ \ 7.35469520 \\ \text{IE}-01 \ \ 7.356303930 \\ \text{E}-01 \ \ 7.356303930 \\ \text{
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    7.421948910E-01 \ 7.421948910E-01 \ 7.425407171E-01 \ 7.425412536E-01 \ 7.421948910E-01
    7.421948910E-01\ 7.425412536E-01\ 7.425407171E-01\ 7.421948910E-01\ 7.421948910E-01
    7.425409555E-01\ 7.425407171E-01\ 7.421951890E-01\ 7.489236593E-01\ 7.493733168E-01
    7.493733168E-01 \ \ 7.489236593E-01 \ \ 7.489236593E-01 \ \ 7.493738532E-01 \ \ 7.493733168E-01
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     7.562797070 {\hbox{\tt E}} - 01 \ \ 7.562797070 {\hbox{\tt E}} - 01 \ \ 7.567867041 {\hbox{\tt E}} - 01 \ \ 7.562797070 {\hbox{\tt E}} - 01
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    7.641946077E-01 \ \ 7.641942501E-01 \ \ 7.636721134E-01 \ \ 7.636721134E-01 \ \ 7.641942501E-01
     7.641946077E-01 7.636716366E-01 7.636721134E-01 7.641942501E-01 7.641941309E-01
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     7.706005573E-01 \ \ 7.711051106E-01 \ \ 7.711053491E-01 \ \ 7.706009746E-01 \ \ 7.706009746E-01
    7.711053491E-01 \ \ 7.711051106E-01 \ \ 7.706005573E-01 \ \ 7.706005573E-01 \ \ \ 7.711053491E-01
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    7.767372727E-01 \ \ 7.767374516E-01 \ \ 7.772034407E-01 \ \ 7.772039175E-01 \ \ 7.767372727E-01
     7.767372727E-01 \ \ 7.772039175E-01 \ \ 7.772034407E-01 \ \ 7.767374516E-01 \ \ 7.767372727E-01
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     7.865741253E-01 7.862046957E-01 7.862046957E-01 7.865741253E-01 7.865735888E-01
     7.862043977E-01 \ \ 7.862043977E-01 \ \ 7.865741253E-01 \ \ 7.865738869E-01 \ \ 7.862046957E-01
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     7.905990481 \pm -01 \ \ 7.905990481 \pm -01 \ \ 7.901998758 \pm -01 \ \ 7.901998758 \pm -01 \ \ 7.905990481 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ \ 0.901998758 \pm -01 \ 
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     8.155226111E-01 8.170753717E-01 8.170760274E-01 8.155240417E-01 8.155240417E-01
    8.170760274E-01 8.170753717E-01 8.155226111E-01 8.155237436E-01 8.170760274E-01
    8.170753717E-01 8.155235052E-01
                                                                                                                             272
     2.362316102E-02 6.178527698E-02 9.494060278E-02 1.106350049E-01 1.106350049E-01
    -9.494060278 \\ E-02-1.106350049 \\ E-01-1.106350049 \\ E-01-9.494060278 \\ E-02-6.178527698 \\ E-02-10.06350049 \\ E-01-10.06350049 2.362316102 \\ E-02 \phantom{0}5.648148060 \\ E-02 \phantom{0}1.475492120 \\ E-01 \phantom{0}2.266284525 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 \phantom{0}2.641122639 \\ E-01 
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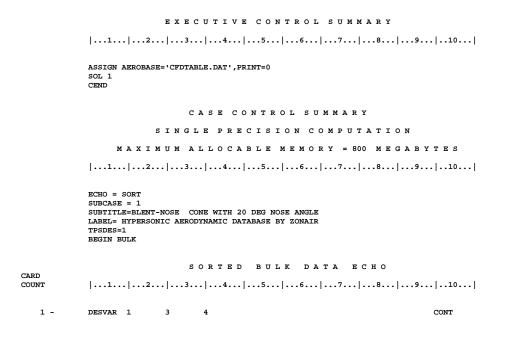
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2.217049599E-01 2.229017615E-01 2.229023576E-01 2.217051387E-01 2.665532827E-01
2.664335370E-01 2.664338350E-01 2.665538788E-01 2.665534616E-01 2.664341331E-01
2.664339542E-01 2.665542364E-01 2.665542364E-01 2.664339542E-01 2.664341331E-01
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2.931547165E-01 2.931540012E-01 2.930420041E-01 2.930420041E-01 2.931540012E-01
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 3.076060414E-01 3.078166842E-01 3.078162670E-01 3.076063395E-01 3.076063395E-01
3.078162670E-01 3.078166842E-01 3.076060414E-01 3.076065779E-01 3.078164458E-01
  3.078169227E-01 3.076060414E-01 3.156692982E-01 3.158937693E-01 3.158932328E-01
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  3.156691194E-01 3.158928156E-01 3.158939481E-01 3.156692982E-01 3.156692982E-01
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 3.209479451E-01 3.207173944E-01 3.207170963E-01 3.209469914E-01 3.209477663E-01
 3.207172751E-01 \ \ 3.207172751E-01 \ \ 3.209477663E-01 \ \ 3.209469914E-01 \ \ 3.207170963E-01
 3.207173944E-01 3.209479451E-01 3.209476471E-01 3.207173944E-01 3.245473504E-01
3.247820735E-01 3.247821927E-01 3.245475292E-01 3.245475292E-01 3.247821927E-01
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3.295210600E-01 \ \ 3.295220137E-01 \ \ 3.292825818E-01 \ \ 3.292831182E-01 \ \ 3.295215964E-01
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3.324642181E-01 3.322266936E-01 3.322266936E-01 3.324642181E-01 3.324648738E-01
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2.922536135E-01 2.938427925E-01
```

• Output Data Listing

Listing 3.4 Standard Output File: CONE_TPS.OUT





2 - 3 - 4 -										
3 -	CONT	4	20	36						CONT
	CONT	2	18	34						CONT
	CONT	15	31	47						CONT
										CONT
5 -	CONT	13	29	45						
6 -	DESVAR	2	3	4						CONT
7 -	CONT	5	21	37						CONT
8 -	CONT	7	23	39						CONT
9 -	CONT	10	26	42						CONT
	CONT	12		44						COIT
10 -			28							
11 -	DESVAR	3	3	4						CONT
12 -	CONT	61	189	269						CONT
13 -	CONT	63	191	271						CONT
14 -	CONT	50	178	258						CONT
15 -	CONT	52	180	260						
16 -	DESVAR	4	3	4						CONT
17 -	CONT	60	188	268						CONT
18 -	CONT	58	186	266						CONT
19 -	CONT	55	183	263						CONT
20 -	CONT	53	181	261						
21 -	PANLST2			1	2	3	4	13	14	+CON
			1.0			19		29		
22 -	+CON	15	16	17	18		20		30	+CON
23 -	+CON	31	32	33	34	35	36	45	46	+CON
24 -	+CON	47	48							
25 -	PANLST2			4	20	36	2	18	34	+CON
26 -	+CON	15	31	47	13	29	45			
			31					_		
27 -	PANLST2			5	6	7	8	9	10	+CON
28 -	+CON	11	12	21	22	23	24	25	26	+CON
29 -	+CON	27	28	37	38	39	40	41	42	+CON
								_	-	
30 -	+CON	43	44							
31 -	PANLST2			12	28	44	10	26	42	+CON
32 -	+CON	7	23	39	5	21	37			
33 -	PANLST2			49	50	51	52	61	62	+CON
			C 4							
34 -	+CON	63	64	65	66	67	68	77	78	+CON
35 -	+CON	79	80	81	82	83	84	93	94	+CON
36 -	+CON	95	96	97	98	99	100	109	110	+CON
37 -										
	+CON	111	112	113	114	115	116	125	126	+CON
38 -	+CON	127	128	129	130	131	132	141	142	+CON
39 -	+CON	143	144	145	146	147	148	157	158	+CON
40 -	+CON	159	160	161	162	163	164	173	174	+CON
41 -	+CON	175	176	177	178	179	180	189	190	+CON
42 -	+CON	191	192	193	194	195	196	205	206	+CON
43 -	+CON	207	208	209	210	211	212	221	222	+CON
44 -	+CON	223	224	225	226	227	228	237	238	+CON
45 -	+CON	239	240	241	242	243	244	253	254	+CON
46 -	+CON	255	256	257	258	259	260	269	270	+CON
47 -						200				. 0011
	+CON	271	272							
48 -	PANLST2	32		61	189	269	63	191	271	CONT
49 -	CONT	50	178	258	52	180	260			
50 -	PANLST2			53	54	55	56	57	58	+CON
51 -	+CON	59	60	69	70	71	72	73	74	+CON
52 -	+CON	75	76	85	86	87	88	89	90	+CON
53 -	+CON	91	92	101	102	103	104	105	106	+CON
54 -	+CON	107	108	117	118	119	120	121	122	+CON
	LCONT	123	124		134	135	126	137	138	+CON
55 -	+CON			133			136			
								153		+CON
56 -	+CON	139	140	149	150	151	152	153	154	+CON
56 - 57 -	+CON +CON	139 155	140 156	149 165	150 166	151 167	152 168	169	154 170	+CON
56 -	+CON	139	140	149	150	151	152		154	
56 - 57 -	+CON +CON +CON	139 155 171	140 156	149 165	150 166 182	151 167 183	152 168	169	154 170	+CON +CON
56 - 57 - 58 - 59 -	+CON +CON +CON	139 155 171 187	140 156 172 188	149 165 181 197	150 166 182 198	151 167 183 199	152 168 184 200	169 185 201	154 170 186 202	+CON +CON +CON
56 - 57 - 58 - 59 - 60 -	+CON +CON +CON +CON	139 155 171 187 203	140 156 172 188 204	149 165 181 197 213	150 166 182 198 214	151 167 183 199 215	152 168 184 200 216	169 185 201 217	154 170 186 202 218	+CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 -	+CON +CON +CON +CON +CON	139 155 171 187 203 219	140 156 172 188 204 220	149 165 181 197 213 229	150 166 182 198 214 230	151 167 183 199 215 231	152 168 184 200 216 232	169 185 201 217 233	154 170 186 202 218 234	+CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 -	+CON +CON +CON +CON	139 155 171 187 203	140 156 172 188 204	149 165 181 197 213	150 166 182 198 214	151 167 183 199 215	152 168 184 200 216	169 185 201 217	154 170 186 202 218	+CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 -	+CON +CON +CON +CON +CON	139 155 171 187 203 219	140 156 172 188 204 220	149 165 181 197 213 229	150 166 182 198 214 230	151 167 183 199 215 231	152 168 184 200 216 232	169 185 201 217 233	154 170 186 202 218 234	+CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 -	+CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251	140 156 172 188 204 220 236 252	149 165 181 197 213 229 245	150 166 182 198 214 230 246	151 167 183 199 215 231 247	152 168 184 200 216 232 248	169 185 201 217 233 249	154 170 186 202 218 234 250	+CON +CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267	140 156 172 188 204 220 236	149 165 181 197 213 229 245 261	150 166 182 198 214 230 246 262	151 167 183 199 215 231 247 263	152 168 184 200 216 232 248 264	169 185 201 217 233 249 265	154 170 186 202 218 234 250 266	+CON +CON +CON +CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 - 65 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42	140 156 172 188 204 220 236 252 268	149 165 181 197 213 229 245 261	150 166 182 198 214 230 246 262	151 167 183 199 215 231 247 263	152 168 184 200 216 232 248 264	169 185 201 217 233 249	154 170 186 202 218 234 250	+CON +CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267	140 156 172 188 204 220 236 252	149 165 181 197 213 229 245 261	150 166 182 198 214 230 246 262	151 167 183 199 215 231 247 263	152 168 184 200 216 232 248 264	169 185 201 217 233 249 265	154 170 186 202 218 234 250 266	+CON +CON +CON +CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 - 65 - 66 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58	140 156 172 188 204 220 236 252 268	149 165 181 197 213 229 245 261 53 266	150 166 182 198 214 230 246 262	151 167 183 199 215 231 247 263	152 168 184 200 216 232 248 264	169 185 201 217 233 249 265	154 170 186 202 218 234 250 266	+CON +CON +CON +CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 - 65 - 66 - 67 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58	140 156 172 188 204 220 236 252 268 186 11	149 165 181 197 213 229 245 261 53 266 12	150 166 182 198 214 230 246 262	151 167 183 199 215 231 247 263	152 168 184 200 216 232 248 264	169 185 201 217 233 249 265	154 170 186 202 218 234 250 266	+CON +CON +CON +CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 - 65 - 66 - 67 - 68 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58 1	140 156 172 188 204 220 236 252 268 186 11	149 165 181 197 213 229 245 261 53 266 12 22	150 166 182 198 214 230 246 262	151 167 183 199 215 231 247 263	152 168 184 200 216 232 248 264	169 185 201 217 233 249 265	154 170 186 202 218 234 250 266	+CON +CON +CON +CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 - 65 - 66 - 67 - 68 - 69 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58 1 2	140 156 172 188 204 220 236 252 268 186 11 21 31	149 165 181 197 213 229 245 261 53 266 12 22 32	150 166 182 198 214 230 246 262	151 167 183 199 215 231 247 263	152 168 184 200 216 232 248 264	169 185 201 217 233 249 265	154 170 186 202 218 234 250 266	+CON +CON +CON +CON +CON +CON +CON
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 - 65 - 66 - 67 - 68 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58 1 2	140 156 172 188 204 220 236 252 268 186 11 21 31	149 165 181 197 213 229 245 261 53 266 12 22	150 166 182 198 214 230 246 262	151 167 183 199 215 231 247 263	152 168 184 200 216 232 248 264	169 185 201 217 233 249 265	154 170 186 202 218 234 250 266	+CON +CON +CON +CON +CON +CON +CON
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56 - 57 - 58 - 59 - 601 - 62 - 63 - 64 - 65 - 66 - 67 - 68 - 70 - 71 - 72 - 73 - 74 - 75 - 77 - 78 - 80 - 81 - 82 - 83 - 84 - 85 - 87 - 88 - 89 - 80 - 81 - 82 - 83 - 84 - 85 - 86 - 87 - 88 - 89 - 80 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58 1 2 3 4 1 -1 2 2 4 1 COPPODRSM 1 0.01 2 1.0 3 0.01 4 0.05 5 0.01 6 0.1 31 0.05 32 0.05 33 1.2	140 156 172 188 204 220 236 252 268 186 11 21 31 41 YES 1 1 1 1 6 1 6 1	149 165 181 197 213 229 245 261 53 266 12 22 42 NO ALL ALL ALL ALL 30000000 UPODRSM. 508 501 245 313 245 103 221 266 260	150 166 182 198 214 230 246 262 181 60	151 167 183 199 215 231 247 263 261 188 NASTRAN CONEIL.	152 168 184 200 216 232 248 264 55 268 AEROMESI PLT PLT SAVE	169 185 201 217 233 249 265 183 H.NAS -1.0 0.05 CONEMI.	154 170 186 202 218 234 250 266 263	+CON +CON +CON +CON +CON +CON CONT CONT CONT CONT CONT CONT CONT C
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 - 65 - 66 - 67 - 68 - 70 - 71 - 72 - 73 - 74 - 75 - 77 - 78 - 77 - 78 - 80 - 81 - 82 - 83 - 84 - 85 - 87 - 88 - 89 - 80 - 81 - 82 - 83 - 84 - 85 - 86 - 87 - 88 - 89 - 80 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58 1 2 2 3 4 1 -1 2 4 1 COPPODRSM 1 0.01 4 0.05 5 0.01 6 0.1 31 0.05 33 1.2 34	140 156 172 188 204 220 236 252 268 181 11 21 31 41 YES 1 1 1 1 6 1 6 1	149 165 181 197 213 229 245 261 53 266 12 22 32 42 NO ALL 30000000 UPODRSM. 501 245 313 245 103 221	150 166 182 198 214 230 246 262 181 60	151 167 183 199 215 231 247 263 261 188 NASTRAN CONEIL.	152 168 184 200 216 232 248 264 55 268 AEROMESI PLT PLT SAVE	169 185 201 217 233 249 265 183 H.NAS -1.0 0.05 CONEMI.	154 170 186 202 218 234 250 266 263	+CON +CON +CON +CON +CON +CON CONT CONT CONT CONT CONT CONT CONT C
56 - 57 - 58 - 59 - 601 - 62 - 63 - 64 - 65 - 66 - 67 - 68 - 70 - 71 - 72 - 73 - 74 - 75 - 77 - 78 - 80 - 81 - 82 - 83 - 84 - 85 - 87 - 88 - 89 - 80 - 81 - 82 - 83 - 84 - 85 - 86 - 87 - 88 - 89 - 80 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58 1 2 2 3 4 1 -1 2 4 1 COPPODRSM 1 0.01 4 0.05 5 0.01 6 0.1 31 0.05 33 1.2 34	140 156 172 188 204 220 236 252 268 186 11 21 31 41 YES 1 1 1 1 6 1 6 1	149 165 181 197 213 229 245 261 53 266 12 22 42 NO ALL ALL ALL ALL 30000000 UPODRSM. 508 501 245 313 245 103 221 266 260	150 166 182 198 214 230 246 262 181 60	151 167 183 199 215 231 247 263 261 188 NASTRAN CONEIL.	152 168 184 200 216 232 248 264 55 268 AEROMESI PLT PLT SAVE	169 185 201 217 233 249 265 183 H.NAS -1.0 0.05 CONEMI.	154 170 186 202 218 234 250 266 263	+CON +CON +CON +CON +CON +CON CONT CONT CONT CONT CONT CONT CONT C
56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - 64 - 65 - 66 - 67 - 68 - 70 - 71 - 72 - 73 - 74 - 75 - 77 - 78 - 77 - 78 - 80 - 81 - 82 - 83 - 84 - 85 - 87 - 88 - 89 - 80 - 81 - 82 - 83 - 84 - 85 - 86 - 87 - 88 - 89 - 80 -	+CON +CON +CON +CON +CON +CON +CON +CON	139 155 171 187 203 219 235 251 267 42 58 1 2 2 3 4 1 -1 2 4 1 COPPODRSM 1 0.01 4 0.05 5 0.01 6 0.1 31 0.05 33 1.2 34	140 156 172 188 204 220 236 252 268 186 11 21 31 41 YES 1 1 1 1 6 1 6 1	149 165 181 197 213 229 245 261 53 266 12 22 42 NO ALL ALL ALL ALL 30000000 UPODRSM. 508 501 245 313 245 103 221 266 260	150 166 182 198 214 230 246 262 181 60	151 167 183 199 215 231 247 263 261 188 NASTRAN CONEIL.	152 168 184 200 216 232 248 264 55 268 AEROMESI PLT PLT SAVE	169 185 201 217 233 249 265 183 H.NAS -1.0 0.05 CONEMI.	154 170 186 202 218 234 250 266 263	+CON +CON +CON +CON +CON +CON CONT CONT CONT CONT CONT CONT CONT C

```
97 -
                               6
                                        245
             STTYPE
                      35
                                                                                               CONT
98 -
99 -
             CONT
                      0.3
             STTYPE
                      36
                               1
                                        103
                                                                                               CONT
100
             CONT
                      0.2
101 -
             THERMPR 1
                               100F
102
             TPSDES
                                                                                               CONT
103
104 -
             TPSSYM
                                                                                               CONT
             CONT
                                         0.008
                                                                                               CONT
106 -
             CONT
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                                         0.5
                                                  4.0
                                                                                               CONT
                                         0.01
107
             CONT
                                                                                               CONT
108 -
             CONT
                      1
                                         0.015
                                                  0.2
                                                                                               CONT
109 -
             CONT
                                         0.01
                                                  0.1
                                                                                               CONT
                                         0.02
111 -
             TPSSYM
                      2
                                                                                               CONT
                                         0.008
112 -
             CONT
                                                                                               CONT
                                        0.5
0.01
113 -
             CONT
                                                  4.0
                                                                                               CONT
114 -
             CONT
                                                  0.1
                                                                                               CONT
115 -
             CONT
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                                                  0.2
                                                                                               CONT
116
             CONT
                                         0.01
                                                  0.1
                                                                                               CONT
             CONT
                                         0.02
118 -
             TPSSYM
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                                                                                               CONT
             CONT
                                         0.008
                                                  0.05
                                                                                               CONT
120
             CONT
                      3
                                        0.5
0.01
                                                  4.0
                                                                                               CONT
121
             CONT
                                                                                               CONT
                                                  0.1
122 -
             CONT
                      3
                                         0.015
                                                  0.2
                                                                                               CONT
123 -
             CONT
                                                                                               CONT
                                         0.01
                                                  0.1
124
             CONT
                                         0.02
                                                  0.2
125 -
             TPSSYM
                                                                                               CONT
                                4
31
126
             CONT
                                         0.003
                                                  0.1
                                                                                               CONT
127 -
             CONT
                                32
                                         0.004
                                                  0.1
                                                                                               CONT
                                33
128
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129
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134
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.68000E22.17754
136 -
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137
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139 -
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140
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141 -
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142 -
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147
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175
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176
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182 -
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191 -
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192 - ENDDATA

SUBCASE = 1 = TPSDES DISCIPLINE BULK ENTRY ID = OPTIMIZATION SYSTEM FOR TPSSYM = 1 TOTAL NUMBER OF DESIGN VARIABLES = 60 TOTAL NUMBER OF CONSTRAINS = 1704
TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
TOTAL NUMBER OF TEMP. PRINTOUTS = 22 MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.2188E+04 1.0 B Α D D F D D F D 0.0 -1.0 + .55 .65 TIME (X 2.803E-44) .05 .15 .25 .35 .75 1.05 MAXIMUM TEMPERATURE OF EVERY LAYER
 LAYER:
 1
 2
 3
 4
 550.33

 Optv:
 2187.64
 2183.67
 448.35
 448.35
 349.07
 350.33 VALUES OF DESIGN VARIABLES : ER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09 DEV10 DEV11 DEV12 1 0.00826 0.00827 0.00800 0.00900 0.00808 0.00808 0.00810 0.00826 0.00827 0.00800 LAYER 1.09182 1.07761 0.92326 1.24383 1.11360 1.05243 1.24383 1.11386 1.05286 1.09181 1.07764 0.92323 3 0.01579 0.01579 0.02410 0.01125 0.01010 0.01010 0.01125 0.01010 0.01012 0.01580 0.01579 0.02410 4 0.12181 0.10537 0.05006 0.19538 0.12863 0.12622 0.19538 0.12865 0.12568 0.12181 0.10539 5 0.01604 0.01606 0.02512 0.01125 0.01010 0.01010 0.01125 0.01010 0.01012 0.01605 0.01606 0.02512 THE ORIGINAL OBJECTIVE FUNCTION = 24.1400013 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.1389003 THE TOTAL OPTIMAL WEIGHT = 3.30052600E+01 OPTIMAL STRUCTURES OF TPS FOR PATCH = (WITH AVERAGE THICKNESS) 0.00828 in. 2187.6 F RCG COATING slab i _____ LI900 slab 1.08382 in. 2183.7 F _____ 0.01452 in. 448.4 F RTV-560 thin skin _____ 5.4 LB SIP 0.12120 in. 448.4 F slab ______ thin skin 0.01478 in. 349.1 F ______ ----ALUMINUM 7075-T6 slab 0.10000 in. 349.1 F i -----_____

```
THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
          LAYER01
                                                                      LAYER04
                                                                                          LAYER05
                                                                                                              LAYER06
                              LAYER02
                                                  LAYER03
                                                                                                              0.10000
0.10000
          0.00892
                    2168.46
                              1.24379
                                        2166.31
                                                  0.01014
                                                             550.33
                                                                      0.19382
                                                                                 448.35
                                                                                          0.01010
                                                                                                     370.46
                                                                                                                         290.34
          0.00900
                    2150.24
                              1.24383
                                        2145.96
                                                  0.01125
                                                             448.01
                                                                      0.19538
                                                                                 448.01
                                                                                          0.01125
                                                                                                     285.87
                                                                                                                         285.87
                    2136.70
                                        2134.67
                                                  0.01293
                                                             550.33
                                                                                 443.28
                                                                                          0.01303
                                                                                                     376.75
                                                                                                              0.10000
                                                                                                                         310.22
           0.00865
                                                                      0.16194
          0.00826
                    2111.13
                              1.09182
                                        2107.36
                                                  0.01579
                                                             437.18
                                                                      0.12181
                                                                                 437.18
                                                                                          0.01604
                                                                                                     338.29
                                                                                                              0.10000
                                                                                                                         338.29
          0.00826
                    2079.82
                                        2076.09
                                                  0.01580
                                                              417.65
                                                                      0.12181
                                                                                          0.01605
                                                                                                              0.10000
     14
          0.00865
                    2136.70
                              1.17688
                                        2134.67
                                                  0.01293
                                                             550.33
                                                                      0.16195
                                                                                 443.29
                                                                                          0.01303
                                                                                                     376.75
                                                                                                              0.10000
                                                                                                                         310.21
                                                                      0.19538
           0.00900
                    2187.64
                              1.24383
                                        2183.67
                                                  0.01125
                                                              448.07
                                                                                 448.07
                                                                                          0.01125
                                                                                                     345.87
                                                                                                              0.10000
                                                                                                                          345.87
     16
          0.00892
                    2168.46
                              1.24381
                                        2166.31
                                                  0.01014
                                                             550.33
                                                                      0.19383
                                                                                 448.35
                                                                                          0.01010
                                                                                                     370.46
                                                                                                              0.10000
                                                                                                                         290.33
      17
          0.00800
                    2187.64
                              1.09823
                                        2185.66
                                                  0.00870
                                                             550.33
                                                                      0.12435
                                                                                 448.35
                                                                                          0.00863
                                                                                                     397.26
                                                                                                              0.10000
                                                                                                                         349.07
                    2164.79
                                                  0.01010
                                                              448.35
                                                                                                      346.18
                                                                                                              0.10000
           0.00808
                                        2160.84
                                                                                          0.01010
      19
          0.00812
                    2143.23
                              1.08988
                                        2141.30
                                                  0.01244
                                                             550.33
                                                                      0.11535
                                                                                 434.72
                                                                                          0.01256
                                                                                                     390.17
                                                                                                              0.10000
                                                                                                                         345.62
                    1969.39
                                                  0.01579
      20
          0.00827
                              1.07761
                                        1965.99
                                                              369.38
                                                                      0.10537
                                                                                 369.38
                                                                                          0.01606
                                                                                                     349.07
                                                                                                              0.10000
                                                                                                                         349.07
      29
          0.00827
                    2079.82
                              1.07764
                                        2077.96
                                                  0.01579
                                                             550.33
                                                                      0.10539
                                                                                 417.65
                                                                                          0.01606
                                                                                                     378.17
                                                                                                              0.10000
                                                                                                                         338.70
      30
          0.00812
                    2143.24
                              1.09018
                                        2141.31
                                                  0.01244
                                                             550.33
                                                                      0.11536
                                                                                 434.70
                                                                                          0.01256
                                                                                                     390.16
                                                                                                              0.10000
                                                                                                                         345.62
      31
32
                    2187.64
2187.64
                              1.11386
          0.00808
                                        2185.66
                                                  0.01010
                                                             550.33
                                                                      0.12865
                                                                                 448.07
                                                                                          0.01010
                                                                                                     396.97
                                                                                                              0.10000
                                                                                                                         345.87
          0.00800
                              1.09834
                                        2185.66
                                                  0.00870
                                                             550.33
                                                                      0.12434
                                                                                 448.35
                                                                                          0.00863
                                                                                                     397.26
                                                                                                              0.10000
                                                                                                                         349.07
           0.00810
                              1.07756
                                                  0.00800
                                                              550.33
                                                                                          0.00800
                                                                                                     397.26
                                                                                                              0.10000
                    2187.64
                                        2185.66
                                                                      0.14072
                                                                                 448.35
      34
          0.00808
                    2164.79
                              1.05243
                                        2162.82
                                                  0.01010
                                                             550.33
                                                                      0.12622
                                                                                 448.35
                                                                                          0.01010
                                                                                                     397.26
                                                                                                              0.10000
                                                                                                                         346.18
          0.00804
                              1.00092
                                        2085.13
                                                  0.01567
                                                              550.33
                                                                      0.09601
                                                                                 417.07
                                                                                          0.01608
                                                                                                     382.20
                                                                                                              0.10000
      36
           0.00800
                    1969.39
                              0.92326
                                        1967.69
                                                  0.02410
                                                             550.33
                                                                      0.05006
                                                                                 369.38
                                                                                          0.02512
                                                                                                     359.23
                                                                                                              0.10000
                                                                                                                         349.07
                                                  0.02410
      45
           0.00800
                    1969.52
                              0.92323
                                        1967.82
                                                             550.33
                                                                      0.05006
                                                                                 369.38
                                                                                          0.02512
                                                                                                     359.23
                                                                                                              0.10000
                                                                                                                         349.07
      46
          0.00806
                    2087.16
                              1.00135
                                        2085.29
                                                  0.01569
                                                             550.33
                                                                      0.09547
                                                                                 416.33
                                                                                          0.01610
                                                                                                     381.84
                                                                                                              0.10000
                                                                                                                         347.35
                    2164.91
                                                                      0.12568
                                                                                                              0.10000
      47
          0.00810
                              1.05286
                                        2162.93
                                                  0.01012
                                                             550.33
                                                                                 447.62
                                                                                          0.01012
                                                                                                     396.91
                                                                                                                         346.21
          0.00811
                    2187.64
                              1.07773
                                        2185.66
                                                  0.00800
                                                             550.33
                                                                      0.14051
                                                                                 448.35
                                                                                          0.00800
                                                                                                     397.26
                                                                                                              0.10000
                                                                                                                         345.64
                   OPTIMIZATION SYSTEM FOR TPSSYM =
 TOTAL NUMBER OF DESIGN VARIABLES =
                                = 1704
 TOTAL NUMBER OF CONSTRAINS
 TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
 TOTAL NUMBER OF TEMP. PRINTOUTS = 22
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  х 0
1.0 в
       0.2086E+04
           В
                 в
                       В
                             В
                                   в
                                        В
                                              В
                                                         В
                                                               А
                                                                                В
                                                                     Α
  0.0
       ·
+-----+--
  -1.0
      .05
                  .15
                              .25
                                          .35
                                                      .45
                                                                   . 55
                                                                                          .75
                                                                                                      .85
                                                                                                                  .95
                                                                                                                            1.05
                                                            TIME ( X 2.803E-44 )
              MAXIMUM TEMPERATURE OF EVERY LAYER
       1 2
2300.33 2400.33
                      2
                          3 4 5
550.33 450.33 550.33
LAYER:
                                                     350.33
Tmax:
Optv:
       2085.86 2082.24 450.29
                                 450.29
                                           349.96
                                                     349.96
                   VALUES OF DESIGN VARIABLES :
                                  DEV04
        DEV01
                 DEV02
                         DEV03
                                           DEV05
                                                     DEV06
                                                              DEV07
                                                                       DEV08
                                                                                DEV09
                                                                                         DEV10
                                                                                                  DEV11
LAYER
                                                                                                           DEV12
      0.00809 0.00908 0.00808 0.00906
                                         0.00800 0.00800 0.00906 0.00800
                                                                              0.00808
                                                                                       0.00809 0.00908
                                                                                                         0.00808
   2 1.07279
               1.17915 0.90940 1.20439
                                         0.96897
                                                   0.80846
                                                            1.20426
                                                                     0.96894
                                                                              0.81500
                                                                                       1.07271
                                                                                                1.17920
                                                                                                         0.90939
      0.01341
               0.01135 0.01010 0.01267 0.02282
                                                   0.01000
                                                            0.01276
                                                                     0.02284
                                                                              0.01010
                                                                                       0.01342
                                                                                                0.01135
                                                                                                         0.01010
      0.12521
               0.19584
                        0.11594
                                 0.19553 0.05276
                                                   0.11018
                                                            0.19552
                                                                     0.05272
                                                                              0.10675
                                                                                       0.12518
                                                                                                0.19584
                                                                                                         0.11594
    5 0.01356 0.01135 0.01010 0.01274 0.02410
                                                   0.01000 0.01283
                                                                    0.02410
                                                                              0.01010
                                                                                       0.01357
                                                                                                0.01135
                                                                                                        0.01010
 THE ORIGINAL OBJECTIVE FUNCTION =
                                       24.1400013
 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.0873410
 THE TOTAL OPTIMAL WEIGHT = 3.15091709E+01
              OPTIMAL STRUCTURES OF TPS FOR PATCH =
                     (WITH AVERAGE THICKNESS)
                      RCG COATING
                                           slab
                                                               0.00839 in. 2085.9 F
 ______
                                                               1.02439 in. 2082.2 F
                      LI900
                                           slab
```

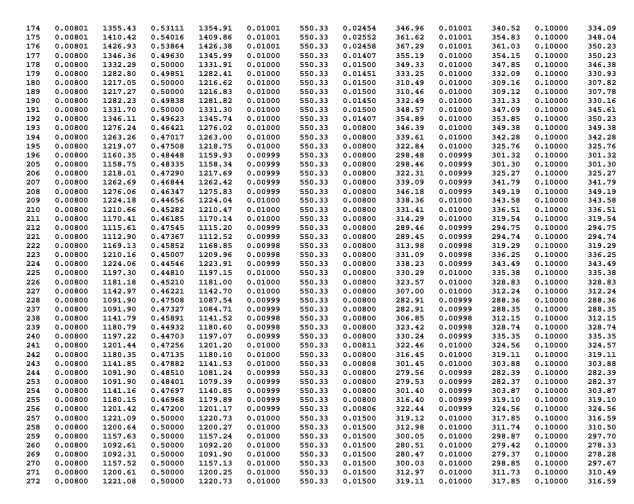
```
i
                      RTV-560
                                          thin skin
                                                               0.01341 in. 450.3 F
                                                               0.13228 in. 450.3 F
                      5.4 LB SIP
                                           slab
 ______
                                                               0.01366 in. 350.0 F
    .....
                      ALUMINUM 7075-T6
                                           slab
                                                               0.10000 in. 350.0 F
                                                                 i
 _____
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
          TAVEDO1
                              TAVEDO2
                                                  T VALDUS
                                                                      TAYER04
                                                                                          TAYER05
                                                                                                              LAYERO6
                    2085.86
                                                                                 449.17
                                                                                                     397.50
                                        2084.05
                                                             550.33
                                                                                                                         345.82
          0.00809
                              1.07279
                                                  0.01341
                                                                      0.12521
                                                                                          0.01356
                                                                                                              0.10000
                                        2046.21
          0.00866
                    2048.08
                              1.14599
                                                  0.01362
                                                             448.50
                                                                      0.16181
                                                                                 448.50
                                                                                          0.01380
                                                                                                              0.10000
                                                                                                     284.53
          0.00906
                    2048.02
                              1.20439
                                        2047.08
                                                  0.01267
                                                             550.33
                                                                      0.19553
                                                                                 448.51
                                                                                          0.01274
                                                                                                     366.55
                                                                                                              0.10000
                                                                                                                         284.60
                    2085.86
                                        2082.24
                                                  0.01565
                                                             449.15
                                                                      0.16864
                                                                                          0.01605
                                                                                                     345.83
                                                                                                              0.10000
          0.00894
                    2012.28
                              1.17295
                                        2010.45
                                                  0.01568
                                                             449.53
                                                                      0.16868
                                                                                 449.53
                                                                                          0.01608
                                                                                                     285.67
                                                                                                              0.10000
                                                                                                                         285.67
                                                                                                                         284.53
      10
          0.00906
                    2048.08
                              1.20426
                                        2047.15
                                                  0.01276
                                                             550.33
                                                                      0.19552
                                                                                 448.50
                                                                                          0.01283
                                                                                                     366.52
                                                                                                              0.10000
      11
          0.00866
                    1958.79
                              1.14573
                                        1956.92
                                                  0.01370
                                                             371.62
                                                                      0.16185
                                                                                 371.62
                                                                                          0.01388
                                                                                                     349.96
                                                                                                              0.10000
                                                                                                                         349.96
          0.00809
                    2085.86
                              1.07271
                                                                      0.12518
                                                                                          0.01357
                                                                                                     397.49
                                                                                                              0.10000
                                        2084.05
                                                  0.01342
                                                             550.33
                                                                                 449.15
                                                                                                                         345.83
      21
          0.00908
                    2012.28
                              1.17915
                                        2011.37
                                                  0.01135
                                                             550.33
                                                                      0.19584
                                                                                 449.53
                                                                                          0.01135
                                                                                                     367.60
                                                                                                              0.10000
     22
23
          0.00840
                    1768.11
                              1.03825
                                        1766.16
                                                  0.01830
                                                             444.03
                                                                      0.10597
                                                                                 444.03
                                                                                          0.01909
                                                                                                     347.47
                                                                                                              0.10000
                                                                                                                         347.47
                    1958.79
                              0.96897
                                        1957.85
                                                  0.02282
                                                             550.33
                                                                                 371.62
                                                                                          0.02410
                                                                                                     360.79
          0.00800
                                                                      0.05276
                                                                                                              0.10000
                                                                                                                         349.96
     24
25
          0.00800
                    1878.00
                              0.87960
                                        1876.45
                                                  0.02532
                                                             446.87
                                                                      0.00935
                                                                                 446.87
                                                                                          0.02689
                                                                                                     347.45
                                                                                                              0.10000
                                                                                                                         347.45
          0.00800
                              0.87980
                                        1919.01
                                                  0.02533
                                                                                          0.02689
                                                                                                     372.24
                                                                                                              0.10000
                    1919.97
                                                             550.33
                                                                      0.00922
                                                                                 362.49
                                                                                                                         349.96
     26
27
          0.00800
                    1958.79
                              0.96894
                                        1957.85
                                                  0.02284
                                                             550.33
                                                                      0.05272
                                                                                 371.57
                                                                                          0.02410
                                                                                                     360.77
                                                                                                              0.10000
                                                                                                                         349.96
                    1968.20
                                        1967.30
                                                                                          0.01909
          0.00840
                              1.03849
                                                  0.01832
                                                             550.33
                                                                      0.10579
                                                                                 401.04
                                                                                                     363.66
                                                                                                              0.10000
                                                                                                                         326.27
          0.00908
                              1.17920
                                                  0.01135
                                                             550.33
                                                                                 449.53
                                                                                          0.01135
                                                                                                              0.10000
      37
          0.00808
                    1878.18
                              0.90940
                                        1877.41
                                                  0.01010
                                                             550.33
                                                                      0.11594
                                                                                 446.87
                                                                                          0.01010
                                                                                                     397.16
                                                                                                              0.10000
                                                                                                                         347.45
      38
          0.00802
                    1810.15
                              0.84728
                                        1809.26
                                                  0.01002
                                                             550.33
                                                                      0.11318
                                                                                 450.22
                                                                                          0.01002
                                                                                                     399.33
                                                                                                              0.10000
                                                                                                                         348.43
      39
          0.00800
                    1765.94
                              0.80846
                                        1764.96
                                                  0.01000
                                                             550.33
                                                                      0.11018
                                                                                 450.29
                                                                                          0.01000
                                                                                                     399.48
                                                                                                              0.10000
                                                                                                                         348.67
      40
          0.00802
                    1764.96
                              0.79162
                                        1744.14
                                                  0.01002
                                                             550.33
                                                                      0.10767
                                                                                 448.40
                                                                                          0.01002
                                                                                                     398.41
                                                                                                              0.10000
                                                                                                                         348.42
      41
          0.00805
                    1764.96
                              0.79410
                                        1744.96
                                                  0.01006
                                                             550.33
                                                                      0.10637
                                                                                 446.03
                                                                                          0.01006
                                                                                                     397.00
                                                                                                              0.10000
                                                                                                                         347.96
      42
          0.00808
                    1768.11
                              0.81500
                                        1767.13
                                                  0.01010
                                                             550.33
                                                                      0.10675
                                                                                 444.03
                                                                                          0.01010
                                                                                                     395.75
                                                                                                              0.10000
                                                                                                                         347.47
          0.00810
                    1812.31
                              0.85393
                                                  0.01012
                                                             550.33
                                                                                 443.86
                                                                                          0.01012
                                                                                                     395.54
                                                                                                              0.10000
                                                                      0.10970
          0.00808
                    1878.00
                              0.90939
                                        1877.22
                                                  0.01010
                                                             550.33
                                                                      0.11594
                                                                                 446.87
                                                                                          0.01010
                                                                                                     397.16
                                                                                                              0.10000
                                                                                                                         347.45
                   OPTIMIZATION SYSTEM FOR TPSSYM =
 TOTAL NUMBER OF DESIGN VARIABLES =
 TOTAL NUMBER OF CONSTRAINS
 TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
TOTAL NUMBER OF TEMP. PRINTOUTS = 22
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1983E+04
           В
                       В
                             В
                                   В
                                        в
                                                    в
                                                               В
                                                                     В
                                                                           В
                                                         D
  -1.0 ÷
                  .15
                              .25
                                                                                          .75
                                                                                                      .85
                                                                                                                  .95
                                          .35
                                                      .45
                                                            .55 .65
TIME ( X 2.803E-44 )
                                                                                                                           1.05
       1 2 3 4 5
2300.33 2400.33 550.33 450.33 550.33
1982.72 1979.12 450.29 450.29
              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:
Tmax:
                                                     350.33
                                                     350.23
Optv:
                   VALUES OF DESIGN VARIABLES :
                                                                                         DEV10
        DEV01
                 DEV02 DEV03
                                 DEV04
                                          DEV05
                                                     DEV06
                                                              DEV07
                                                                       DEV08
                                                                                DEV09
LAYER
                                                                                                  DEV11
   1 0.00808 0.00800 0.00800 0.00810 0.00800 0.00800 0.00800 0.00800
                                                                                       0.00809 0.00800 0.00800
      0.69612
               0.50000
                        0.50000
                                 0.87185
                                          0.50000
                                                   0.50000
                                                            0.85142
                                                                     0.50000
                                                                              0.50000
                                                                                       0.68282
   3 0.01010 0.01000 0.01000
                                 0.01013
                                          0.01000
                                                   0.01000
                                                            0.01000
                                                                     0.01000
                                                                              0.01000
                                                                                       0.01011
                                                                                                0.01000
                                                                                                         0.01000
      0.10220
               0.01500
                        0.01500
                                 0.11240
                                          0.01500
                                                   0.01500
                                                            0.11065
                                                                     0.01500
                                                                              0.01500
                                                                                       0.10181
                                                                                                0.01500
                                                                                                         0.01500
               0.01000
                        0.01000
                                 0.01013 0.01000
                                                   0.01000
                                                            0.01000
                                                                     0.01000
                                                                              0.01000
                                                                                       0.01011
```

THE ORIGINAL OBJECTIVE FUNCTION = 112.6533356

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.6718338

THE TOTAL OPTIMAL WEIGHT = 7.69771397E+03

	OPTI		URES OF TPS		H = 3							
======	=======					i						
			ATING			i)2 in. 19	82.7 F				
		LI900		slab		i 0.5918 i	35 in. 19	79.1 F				
======			======= 0		======= skin	=	03 in. 4	50.3 F				
======												
		5.4 LB	SIP	slab		0.0455 i	59 in. 4	50.3 F				
		RTV-56	0	thin a	======== skin =========	0.0100	3 in. 3	50.2 F				
		ALUMIN	UM 7075-T6	slab		i 0.1000 i	00 in. 3	50.2 F				
	THICKNESS	AND TEMPE	RATURE OF 1	LAYERS FOR	PATCH =	3						
PANEL 49	LAYER01 0.00802	1982.72	LAYER02 0.88797	1980.92	LAYER03	550.33	LAYER04	449.37	LAYER05	399.48	LAYER06	349.58
50	0.00800	1982.72	0.85142	1980.92	0.01000				0.01003 0.01000			
51 52	0.00801 0.00809		0.77996 0.68282						0.01002	399.78 398.19	0.10000 0.10000	349.90 347.91
61	0.00808		0.69612			550.33	0.10181	448.47 448.14	0.01011			347.51
62	0.00812	1887.79	0.80441	1886.39	0.01015	550.33	0.10838	447.40	0.01015	397.07	0.10000	346.73
63 64	0.00810 0.00807		0.87185 0.89596		0.01013			448.17 448.50		397.67 398.42		347.18 348.34
65	0.00802		0.84645			550.33	0.10204	440.60	0.01003	395.85	0.10000	350.23
66	0.00800		0.81470		0.01000	349.33	0.10065	349.33	0.01000			346.38
67 68	0.00801 0.00808		0.75039 0.66371		0.01001			438.45 310.49			0.10000 0.10000	348.91 307.82
77	0.00807		0.67563			550.33	0.09309	434.64	0.01009		0.10000	
78	0.00810		0.77225					436.33			0.10000	
79 80	0.00809 0.00806		0.83299 0.85376		0.01012 0.01008	550.33	0.10222	438.81 439.77	0.01012	393.43 394.84		348.05
81	0.00802		0.79189					428.75		390.81		
82	0.00800		0.76597		0.01000				0.01000		0.10000	
83 84	0.00801 0.00807		0.71122 0.63837		0.01001 0.01008	550.33	0.08404	423.43 416.82	0.01001		0.10000 0.10000	347.43 340.03
93	0.00806	1629.93	0.64843	1629.23	0.01008	550.33	0.08100	416.56	0.01008	378.19	0.10000	339.83
94 95	0.00809 0.00808		0.72967 0.78144		0.01011 0.01010			421.49 426.20		383.14 387.61	0.10000 0.10000	344.80 349.02
96	0.00805		0.79800			550.33	0.08886	427.99	0.01016		0.10000	350.23
97	0.00801		0.73052			550.33	0.07289	415.09	0.01002			350.23
98 99	0.00800 0.00801	1735.20 1654.07		1733.96 1653.11	0.01000 0.01001			413.34 406.21	0.01000 0.01001	382.67 375.83		350.23 345.45
100	0.00805		0.60984					396.15			0.10000	
109	0.00805		0.61783					280.47				278.28
110 111	0.00807 0.00806	1657.24	0.68178 0.72341	1656.23	0.01009 0.01008		0.07076	404.48	0.01009	373.83 310.49	0.10000 0.10000	343.17 310.49
112	0.00804		0.73532					414.42			0.10000	
113	0.00801		0.67854		0.01001			403.15			0.10000	
114 115	0.00800 0.00801	1576.54	0.66461 0.62986	1649.97 1575.70	0.01000 0.01001	550.33	0.05980 0.05744	391.29	0.01000 0.01001	376.26 367.36	0.10000 0.10000	350.23 343.44
116	0.00804	1471.15	0.58564	1470.61	0.01005	550.33	0.05567	378.33	0.01005	354.04	0.10000	329.75
125 126	0.00804 0.00805	1481.12 1578.86	0.59187 0.64120	1480.52 1577.99	0.01005 0.01007	550.33 550.33	0.05585 0.05832	378.15 389.74	0.01005 0.01007	353.88 365.60	0.10000 0.10000	329.61 341.47
127	0.00805	1650.57	0.64120	1649.50	0.01007	550.33	0.05832	399.03	0.01007	374.56	0.10000	350.09
128	0.00803	1676.39	0.68225	1675.26	0.01004	550.33	0.06016	402.55	0.01004	378.66	0.10000	350.23
129 130	0.00801 0.00800	1596.97 1574.49	0.63222 0.62307	1596.04 1573.61	0.01001 0.01000	550.33 550.33	0.04820 0.04850	392.12 388.67	0.01001 0.01000	374.09 370.16	0.10000 0.10000	350.23 350.23
131	0.00800	1506.04	0.59658	1505.31	0.01001	550.33	0.04657	377.62	0.01001	359.45	0.10000	341.29
132	0.00803	1410.72	0.56403	1410.21	0.01004	550.33	0.04540	362.10	0.01004	343.59	0.10000	325.09
141 142	0.00803 0.00804	1418.24 1507.62	0.56868 0.60501	1417.68 1506.85	0.01004 0.01005	550.33 550.33	0.04554 0.04721	361.96 376.25	0.01004 0.01005	343.47 357.92	0.10000 0.10000	324.98 339.60
143	0.00804	1573.99	0.63023	1573.09	0.01005	550.33	0.04911	387.35	0.01005	368.68	0.10000	350.01
144	0.00802 0.00801	1596.56	0.63496	1595.62	0.01003	550.33 550.33	0.04844	391.58	0.01003	373.49	0.10000	350.23
145 146	0.00801	1512.52 1493.34	0.58442 0.58005	1511.79 1492.63	0.01001 0.01000	550.33	0.03620 0.03679	380.17 375.88	0.01001 0.01000	368.11 363.32	0.10000 0.10000	350.23 350.23
147	0.00800	1431.26	0.56218	1430.65	0.01000	550.33	0.03532	362.98	0.01000	350.78	0.10000	338.57
148	0.00802	1346.34 1351.32	0.54165	1345.85	0.01002 0.01002	550.33	0.03478 0.03486	344.86	0.01002	332.35	0.10000 0.10000	319.84
157 158	0.00802 0.00803	1351.32	0.54468 0.56761	1350.80 1431.43	0.01002	550.33 550.33	0.03486	344.75 361.81	0.01002 0.01003	332.25 349.50	0.10000	319.75 337.18
159	0.00802	1492.79	0.58471	1492.07	0.01003	550.33	0.03719	374.74	0.01003	362.07	0.10000	349.40
160	0.00801	1512.16	0.58616	1511.42	0.01002	550.33	0.03635	379.71	0.01002	367.61	0.10000	350.23
161 162	0.00800	1427.23 1411.00	0.53786 0.53795	1426.69 1410.47	0.01000 0.01000	550.33 550.33	0.02451 0.02533	367.67 362.57	0.01000 0.01000	361.43 355.83	0.10000 0.10000	350.23 349.10
163	0.00800	1355.36	0.52861	1354.86	0.01000	550.33	0.02335	347.94	0.01000	341.55	0.10000	335.16
164	0.00801	1280.58	0.51974	1280.12	0.01001	550.33	0.02437	327.32	0.01001	320.68	0.10000	314.05
173	0.00801	1283.06	0.52118	1282.58	0.01001	550.33	0.02442	327.25	0.01001	320.62	0.10000	313.99



OPTIMIZATION SYSTEM FOR TPSSYM = 4

TOTAL NUMBER OF DESIGN VARIABLES = 60
TOTAL NUMBER OF CONSTRAINS = 2584
TOTAL NUMBER OF TEMP. CONSTRAINS = 1584
TOTAL NUMBER OF TEMP. PRINTOURS = 22

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES 0.1644E+04 1.0 C C C C С C C C C C C F D C D C C F C 0.0 -1.0 + . 05 .35 .55 .65 TIME (X 2.803E-44) .75 .85 .95 1.05 .15 .25 .45

 LAYER:
 1
 2
 3
 4
 5
 6

 Tmax:
 2300.33
 2020.33
 1800.33
 2020.33
 550.33
 350.33

 Optv:
 1643.91
 1643.91
 1637.62
 356.70
 350.07
 350.08

VALUES OF DESIGN VARIABLES : DEV01 DEV03 DEV06 DEV07 DEV08 DEV09 DEV10 1 0.00300 0.00300 0.00300 0.00300 0.00300 0.00300 0.00300 0.00300 0.00300 0.00300 0.00300 0.00300 0.00400 0.00400 0.00400 0.00400 0.00400 0.00400 0.00400 0.00400 0.00400 0.00400 0.00400 0.00400 0.20000 0.48603 0.21535 0.20000 0.39225 0.20000 0.20000 0.39285 0.20000 0.20000 0.47696 0.21542 0.01500 0.01500 0.01500 0.01500 0.01500 0.01500 0.01500 0.01500 0.01500 0.01500 0.01500 0.01500 0.00500 0.00500 0.00500 0.00500 0.00500 0.00500 0.00500 0.00500 0.00500 0.00500 THE ORIGINAL OBJECTIVE FUNCTION = 477.6333618 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.0556153 THE TOTAL OPTIMAL WEIGHT = 1.17136855E+04 OPTIMAL STRUCTURES OF TPS FOR PATCH = (WITH AVERAGE THICKNESS) ______ HRSI COAT thin skin 0.00300 in. 1643.9 F AB312 Fabric slab 0.00400 in. 1643.9 F 0.28157 in. 1637.6 F Q-Felt(3.5 PCF) slab AB312 Fabric slab 0.01500 in. 356.7 F i -----_____ 0.00500 in. 350.1 F RTV-560 thin skin ALUMINUM 7075-T6 0.20000 in. 350.1 F THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = PANEL LAYER01 LAYER02 LAYER03 LAYER04 LAYER05 LAYER06 53 0.00300 1632.96 0.00400 1632.96 0.47696 1629.89 0.01500 991.67 0.00500 353.24 0.20000 349.96 1561.58 1561.58 0.42628 1558.06 955.21 0.00500 352.44 0.20000 0.00300 0.00400 0.01500 349.01 0.01500 0.00300 1515.83 0.00400 1515.83 0.39285 1512.01 931.86 0.00500 352.00 0.20000 348.47 56 0.00300 1489.47 0.00400 1489.47 0.37495 1485.52 0.01500 918.33 0.00500 351.52 0.20000 347.96 0.00300 1488.89 0.00400 1488.89 0.37445 1484.94 0.01500 0.00500 351.52 0.20000 347.98 918.03 58 0.00300 1515.15 0.00400 1515.15 0.39225 1511.33 0.01500 931,49 0.00500 351.99 0.20000 348.52 0.01500 0.00500 60 0.00300 1643.91 0.00400 1643.91 0.48603 1640.76 0.01500 997.07 0.00500 353.30 0.20000 350.08 1577.80 69 0.00300 1581.00 0.00400 1581.00 0.45008 0.01500 966.04 0.00500 353.30 0.20000 350.08 70 0.00300 953.74 0.00400 953.74 0.40321 946.58 0.01500 313.40 0.00500 305.59 0.20000 305.59 71 0.00300 1460.16 0.00400 1460.16 0.37269 1456.36 0.01500 902.31 0.00500 348.48 0.20000 344.91 356.70 72 0.00300 0.00400 1101.37 0.35606 1092.80 0.01500 0.00500 349.85 0.20000 349.86 1101.37 73 0.00300 1432.21 0.00400 1432.21 0.35561 1428.30 0.01500 887.59 0.00500 347.18 0.20000 343.58 0.00500 75 0.00300 1509.06 0.00400 1509.06 0.40495 1505.47 0.01500 928.03 0.00500 350.77 0.20000 347.36 76 0.00300 1590.82 0.00400 1590.82 0.45819 1587.55 0.01500 970.88 0.00500 353.30 0.20000 350.08 85 0.00300 1511.42 0.00400 1511.42 0.41434 1508.04 0.01500 931.63 0.00500 353.30 0.20000 350.08 86 0.00300 1433.84 0.00400 1433.84 0.37262 1430.22 0.01500 889.13 0.00500 348.14 0.20000 344.63 87 0.00300 1385.75 0.00400 1385.75 0.34596 1381.96 0.01500 862.73 0.00500 343.64 0.20000 340.01 88 0.00300 1356.67 0.00400 1356.67 0.33085 1352.81 0.01500 846.90 0.00500 341.15 0.20000 337.46 0.00300 1356.24 0.00400 1356.24 0.33048 1352.39 0.01500 0.00500 0.20000 846.72 341.22 90 0.00300 1385.27 0.00400 1385.27 0.34550 1381.48 0.01500 862.56 0.00500 343.82 0.20000 340.22 91 0.00400 0.37408 0.01500 0.00500 0.20000 0.00300 1435.69 1435.69 1432.05 890.11 348.34 344.87 92 0.00300 1519.73 0.00400 1519.73 0.42118 1516.30 0.01500 935.73 0.00500 353.30 0.20000 350.08 0.00300 0.20000 101 1431.98 0.00400 1431.98 0.37397 1428.42 0.01500 892.19 0.00500 353.30 350.08 0.33816 0.20000 102 0.00300 0.00400 1350.66 1346.97 0.01500 845.92 0.00500 345.00 103 0.00300 1301.04 0.00400 1301.04 0.31586 1297.28 0.01500 817.56 0.00500 337.89 0.20000 334.19 104 0.00300 0.00400 0.30257 1266.47 800.27 0.00500 334.09 0.20000 330.32 1270.26 1270.26 0.01500 105 0.00300 979.28 0.00400 979.28 0.30228 971.08 0.01500 324.63 0.00500 318.03 0.20000 318.03 106 0.00300 1300.68 1300.68 0.31550 1296.93 0.01500 817.50 0.00500 338.17 0.20000 0.00400 334.49 849.52 107 0.00300 0.00400 849.52 0.33932 843.07 0.01500 279.06 0.00500 271.85 0.20000 271.85 0.00300 1438.60 0.20000 108 0.00400 1438.60 0.37939 1434.99 0.01500 895.46 0.00500 353.30 350.08 0.00300 1363.39 0.00400 1363.39 0.33958 1359.66 0.01500 857.98 0.00500 353.30 0.20000 350.08 118 0.00300 1279.06 0.00400 1279.06 0.30890 1275.32 0.01500 808.59 0.00500 342.01 0.20000 338.40 119 0.00300 1228.16 0.00400 1228.16 0.29033 1224.42 0.01500 778.56 0.00500 332.68 0.20000 328.92 120 0.00300 1196.09 0.00400 1196.09 0.27867 1192.37 0.01500 760.11 0.00500 327.76 0.20000 323.93 0.27844 327.91 0.00500 0.20000 121 0.00300 1195.85 0.00400 1195.85 1192.12 0.01500 760.07 324.09 333.04 0.00300 1227.90 0.00400 1227.90 0.29005 1224.16 0.01500 778.60 0.00500 0.20000 329.30 123 0.00300 1280.24 0.00400 1280.24 0.30980 1276.50 0.01500 809.36 0.00500 342.39 0.20000 338.81 124 0.00300 1368.57 0.00400 1368.57 0.34378 1364.80 0.01500 860.54 0.00500 353.30 0.20000 350.08 133 0.00300 1300.89 0.00400 1300.89 0.30870 1297.01 0.01500 826.63 0.00500 353.30 0.20000 350.08 134 0.00300 1214.03 0.00400 1214.03 0.28275 1210.25 0.01500 774.55 0.00500 338.99 0.20000 335.35 135 0.00300 1161.99 0.00400 1161.99 0.26754 1158.28 0.01500 743.03 0.00500 327.68 0.20000 323.88 1128.94 0.25741 0.20000 136 0.00300 0.00400 1128.94 1125.27 0.01500 723.62 0.00500 321.76 317.88 0.00300 1128.77 0.00400 1128.77 0.25724 1125.10 0.01500 723.63 0.00500 321.94 0.20000 137 318.07 138 0.00300 1161.82 0.00400 1161.82 0.26733 1158.11 0.01500 743.15 0.00500 328.11 0.20000 324.32 0.00300 0.00400 0.28340 0.00500 0.20000 1214.94 1214.94 1211.15 0.01500 339.44 140 0.00300 1304.77 0.00400 1304.77 0.31182 1300.87 0.01500 828.56 0.00500 353.30 0.20000 350.08 0.00300 0.00400 0.27651 1230.37 0.01500 793.06 0.00500 353.30 0.20000 350.08 150 0.00300 1145.17 0.00400 1145.17 0.25562 1141.36 0.01500 738.30 0.00500 335.39 0.20000 331.72 0.00300 1091.97 0.24393 1088.30 0.01500 705.24 0.00500 322.02 0.20000 151 1091.97 0.00400 318.17 0.00300 0.00400 1058.12 0.23552 1054.52 0.01500 0.00500 315.06 0.20000 0.00300 1058.02 0.00400 1058.02 0.23541 1054.42 0.01500 685.00 0.00500 315.26 0.20000 311.33

154	0.00300	1091.87	0.00400	1091.87	0.24379	1088.20	0.01500	705.44	0.00500	322.51	0.20000	318.67
155	0.00300	1145.78	0.00400	1145.78	0.25604	1141.96	0.01500	738.85	0.00500	335.90	0.20000	332.24
156	0.00300	1236.93	0.00400	1236.93	0.27851	1232.89	0.01500	794.33	0.00500	353.30	0.20000	350.08
165	0.00300	1166.61	0.00400	1166.61	0.24465	1162.44	0.01500	758.50	0.00500	353.30	0.20000	350.08
166	0.00300	1075.46	0.00400	1075.46	0.22901	1071.60	0.01500	701.29	0.00500	331.13	0.20000	327.44
167	0.00300	1021.14	0.00400	1021.14	0.22083	1017.50	0.01500	666.73	0.00500	315.73	0.20000	311.86
168	0.00300	986.84	0.00400	986.84	0.21427	983.31	0.01500	645.75	0.00500	307.74	0.20000	303.77
169	0.00300	986.80	0.00400	986.80	0.21423	983.27	0.01500	645.84	0.00500	307.96	0.20000	303.99
170	0.00300	1021.10	0.00400	1021.10	0.22076	1017.47	0.01500	667.00	0.00500	316.27	0.20000	312.40
171	0.00300	1075.75	0.00400	1075.75	0.22919	1071.91	0.01500	701.72	0.00500	331.69	0.20000	328.00
172	0.00300	1167.83	0.00400	1167.83	0.24556	1163.66	0.01500	759.12	0.00500	353.30	0.20000	350.08
181	0.00300	1101.35	0.00400	1101.35	0.21542	1097.06	0.01500	724.73	0.00500	353.26	0.20000	349.84
182	0.00300	1009.06	0.00400	1009.06	0.20493	1005.19	0.01500	665.60	0.00500	326.17	0.20000	322.47
183	0.00300	953.73	0.00400	953.73	0.20000	950.14	0.01500	629.69	0.00500	308.93	0.20000	305.03
184	0.00300	919.61	0.00400	919.61	0.19542	916.16	0.01500	608.35	0.00500	300.00	0.20000	296.00
185	0.00300	919.62	0.00400	919.62	0.19543	916.17	0.01500	608.47	0.00500	300.23	0.20000	296.23
186	0.00300	953.74	0.00400	953.74	0.20000	950.16	0.01500	629.99	0.00500	309.49	0.20000	305.59
187	0.00300	1009.06	0.00400	1009.06	0.20490	1005.20	0.01500	665.90	0.00500	326.75	0.20000	323.03
188	0.00300	1101.37	0.00400	1101.37	0.21535	1097.08	0.01500	724.75	0.00500	353.28	0.20000	349.86
197	0.00300	1043.40	0.00400	1043.40	0.19160	1039.04	0.01500	694.00	0.00500	349.90	0.20000	346.49
198	0.00300	951.11	0.00400	951.11	0.18585	947.25	0.01500	633.78	0.00500	320.47	0.20000	316.76
199	0.00300	895.08	0.00400	895.08	0.18363	891.54	0.01500	596.83	0.00500	301.76	0.20000	297.86
200	0.00300	861.87	0.00400	861.87	0.18103	858.51	0.01500	575.60	0.00500	292.06	0.20000	288.07
201	0.00300	861.91	0.00400	861.91	0.18107	858.55	0.01500	575.73	0.00500	292.28	0.20000	288.28
202	0.00300	895.10	0.00400	895.10	0.18368	891.57	0.01500	597.13	0.00500	302.30	0.20000	298.39
203	0.00300	950.85	0.00400	950.85	0.18565	947.00	0.01500	633.94	0.00500	321.02	0.20000	317.30
204	0.00300	1042.46	0.00400	1042.46	0.19076	1038.10	0.01500	693.54	0.00500	349.91	0.20000	346.49
213	0.00300	998.16	0.00400	998.16	0.17628	993.77	0.01500	668.86	0.00500	344.94	0.20000	341.54
214	0.00300	907.46	0.00400	907.46	0.17447	903.63	0.01500	608.75	0.00500	314.03	0.20000	310.35
215	0.00300	851.11	0.00400	851.11	0.17411	847.64	0.01500	571.24	0.00500	294.43	0.20000	290.55
216	0.00300	849.05	0.00400	845.82	0.17341	816.58	0.01500	550.75	0.00500	284.24	0.20000	280.28
217	0.00300	849.05	0.00400	845.82	0.17348	816.61	0.01500	550.87	0.00500	284.43	0.20000	280.46
218	0.00300	851.09	0.00400	851.09	0.17419	847.63	0.01500	571.48	0.00500	294.91	0.20000	291.02
219	0.00300	907.00	0.00400	907.00	0.17419	903.17	0.01500	608.78	0.00500	314.51	0.20000	310.81
220	0.00300	996.63	0.00400	996.63	0.17500	992.24	0.01500	668.10	0.00500	344.93	0.20000	341.51
229	0.00300	970.97	0.00400	970.97	0.17246	966.61	0.01500	651.87	0.00500	338.11	0.20000	334.73
230	0.00300	883.83	0.00400	883.83	0.17341	880.06	0.01500	593.41	0.00500	306.90	0.20000	303.27
231	0.00300	849.05	0.00400	845.82	0.17372	824.29	0.01500	555.95	0.00500	287.18	0.20000	283.37
232	0.00300	849.05	0.00400	845.82	0.17476	796.42	0.01500	537.00	0.00500	276.87	0.20000	272.99
233	0.00300	849.05	0.00400	845.82	0.17483	796.41	0.01500	537.06	0.00500	277.01	0.20000	273.12
234	0.00300	849.05	0.00400	845.82	0.17380	824.17	0.01500	556.07	0.00500	287.53	0.20000	283.70
235	0.00300	883.24	0.00400	883.24	0.17313	879.48	0.01500	593.30	0.00500	307.24	0.20000	303.59
236	0.00300	969.34	0.00400	969.34	0.17117	964.99	0.01500	651.06	0.00500	338.08	0.20000	334.69
245	0.00300	966.29	0.00400	966.29	0.18251	962.05	0.01500	645.21	0.00500	329.27	0.20000	325.93
246	0.00300	884.96	0.00400	884.96	0.18474	881.29	0.01500	590.18	0.00500	299.18	0.20000	295.63
247	0.00300	849.05	0.00400	845.82	0.18428	826.31	0.01500	553.50	0.00500	280.27	0.20000	276.56
248	0.00300	849.05	0.00400	845.82	0.18681	803.01	0.01500	536.98	0.00500	271.80	0.20000	271.80
249	0.00300	849.05	0.00400	845.82	0.18685	802.90	0.01500	536.96	0.00500	271.80	0.20000	271.80
250	0.00300	849.05	0.00400	845.82	0.18433	826.02	0.01500	553.43	0.00500	280.42	0.20000	276.70
251	0.00300	884.34	0.00400	884.34	0.18458	880.68	0.01500	589.95	0.00500	299.31	0.20000	295.74
252	0.00300	965.17	0.00400	965.17	0.18175	960.93	0.01500	644.63	0.00500	329.21	0.20000	325.87
261	0.00300	979.28	0.00400	979.28	0.20000	975.18	0.01500	647.85	0.00500	321.33	0.20000	318.03
262	0.00300	901.24	0.00400	901.24	0.20000	897.67	0.01500	595.65	0.00500	293.72	0.20000	290.23
263	0.00300	849.52	0.00400	849.52	0.20000	846.29	0.01500	561.07	0.00500	275.45	0.20000	271.85
264	0.00300	849.05	0.00400	845.82	0.20000	821.76	0.01500	544.57	0.00500	271.80	0.20000	271.80
265	0.00300	849.05	0.00400	845.82	0.20000	821.57	0.01500	544.47	0.00500	271.80	0.20000	271.80
266	0.00300	849.05	0.00400	849.05	0.20000	845.82	0.01500	560.81	0.00500	275.41	0.20000	271.80
267	0.00300	900.68	0.00400	900.68	0.20000	897.11	0.01500	595.34	0.00500	293.65	0.20000	290.16
268	0.00300	978.96	0.00400	978.96	0.20000	974.86	0.01500	647.66	0.00500	321.25	0.20000	317.95

4.0 Blunt Nose Wedge

- Purpose: To demonstrate the applicability of the TPSOPT software system for a wedge

with blunt nose over a wide range of flight conditions.

- *Input File*: - Standard input File: WEDGE_TPS.INP (Listing 4.1)

- Aerodynamic Database: CFDTABLE.DAT (Listing 4.2)

Geometry File: CFDGEO.DAT (Binary file)ZONAIR Solution File: THERMi (Listing 4.3)

- Output File: - Standard Output File: WEDGE_TPS.OUT (Listing 4.4)

- Vehicle Surface Mesh: WEDGE30.NAS (Figure 4.1)

- Response surfaces for POD analysis (Figure 4.4)

- Cp and Temperature Plot File: CPTEMP.PLT (Figure 4.5)

- Thickness Distribution Plot File: WEDGE30.PLT (Figure 4.6)

4.1 The Surface Mesh of the Blunt Nose Wedge

A blunt nose wedge configuration is analyzed in this example. The wedge is subjected to a two-dimentional flow condition in x-z-plane. Therefore, only one panel is placed along longitudinal dirction (y-direction) as shown in Figure 4.1. The surface mesh is generated by ZONAIR and outputted as the binary file "CFDGEO.DAT". The surface consists of 64 panels and 66 grid points. These panels and grid points are stored in a file named CFDGEO.DAT which is used in TPSOPT by specifying the name on the second row of the aerodynamic database (CFDTABLE.DAT) that is imported by the "ASSIGN AEROBASE=" executive control command.

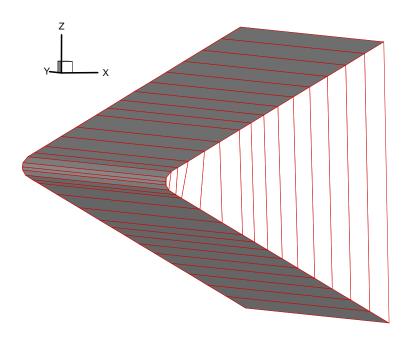


Figure 4.1. Blunt cone surface mesh

4.2 The Aerodynamic Database: CFDTABLE.DAT

The aerodynamic database is generated by running ZONAIR for 324 combinations of 9 Mach numbers (2,3,4,6,8,10,12,14,15) and 36 angles of attack (0,2,4,6,8,10,11-40). This file provides the TPSOPT system with all of the flow field information from ZONAIR. The first row is a title card (A WEDGE PROBLEM WITH 30 DEG OPENING ANGLE); the second row provide the geometry file name (CFDGEO.DAT); the third and fourth rows list the name of the reference chord, span, ...etc, and their values, respectively; the fifth row lists the names of items in the following rows (Mach number, Altitude, Angle of attack, etc.) and the remaining rows contain the values of the items listed in the fifth row and the file names (THERM0001-THERM0324) in the last column which store the velocities and pressure coefficients for the combination of the Mach number and Angle of attack listed in the corresponding row.

4.3 The Standard Input File (WEDGE TPS.INP)

The standard input file consists of two major parts: the airflow information and the TPS optimization system. The airflow information is provided by ZONAIR and imported by the aerodynamic database (CFDTABLE.DAT) using the following statement on the first row of the input file:

ASSIGN AEROBASE='CFDTABLE.DAT'

The TPS optimization system is the major portion of the standard input file, which includes the specification of trajectory data and definition of patches for the TPS. Three patches are defined over the TPS (Figure 4.2), among which patch 1 is located on the nose of the vehicle and patches

2 and 3 are for the remaing part. Figure 4.3 shows individual patches and panel numbers defined over them.

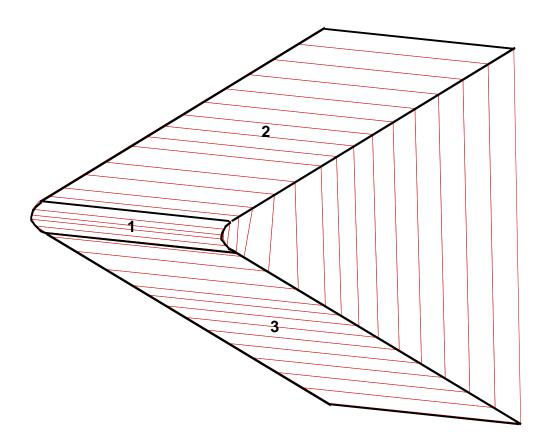
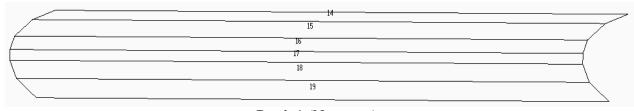
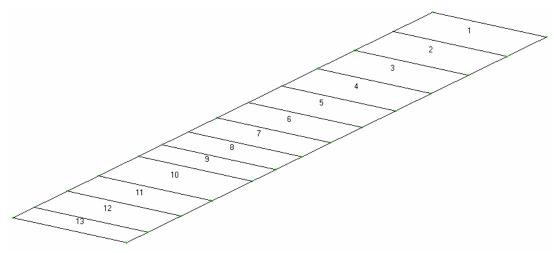


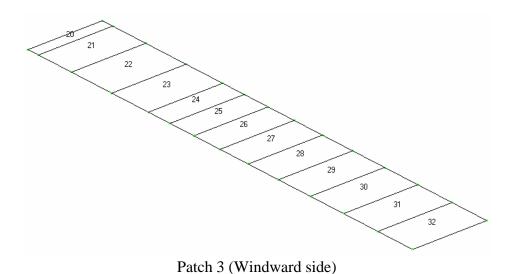
Figure 4.2. Three patches defined over the surface of the wedge



Patch 1 (Nose cap)



Patch 2 (Leeward side)



i atem 5 (williawara side)

Figure 4.3. Three separated patches defined over wedge

4.4 Thermal Structures for TPS

Two sets of 6 layered TPS structures are used for the blunt wedge configuration. The first one is for the nose patch (patch 1) and the windward side patch (patch 3), and the second one for the leeward patch (patch 2).

The thermal structures specified for the first set of TPS use the STTYPE numbers 1, 2, 3, 4, 5 and 6 are Slab, Slab, Thin skin, Slab, Thin skin and Slab, and the corresponding optimization materials are 508 (RCG Coating), 501 (LI-9000), 245 (RTV-560), 313 (5.4LB SIP), 245 (RTV-

560) and 103 (Aluminum). The maximum temperatures for these materials are: $2760 \, ^{0}R$, $2860 \, ^{0}R$, $1010 \, ^{0}R$, $910 \, ^{0}R$, $1010 \, ^{0}R$, and $810 \, ^{0}R$.

The structures specified for the second set of TPS are the AFRSI (Advanced Flexible Reusable Surface Insulation) TPS which consists of 6 layers: Thin skin, Slab, Slab, Slab, Thin skin and Slab denoted by the STTYPE numbers 31, 32, 33, 34, 35 and 36. The corresponding optimization materials are 221 (HRSI COAT), 266 (AB312 Fabric), 260 (Q-Felt), 266 (AB312 Fabric), 245 (RTV-560) and 103 (Aluminum) and the maximum temperatures for these materials are: $2760^{\circ}R$, $2480^{\circ}R$, $2480^{\circ}R$, $2260^{\circ}R$, and $810^{\circ}R$.

The sixth layer of both sets of the TPS is defined as the structure layer. That means that the thickness of the sixth layer is constant during the computation of optimization.

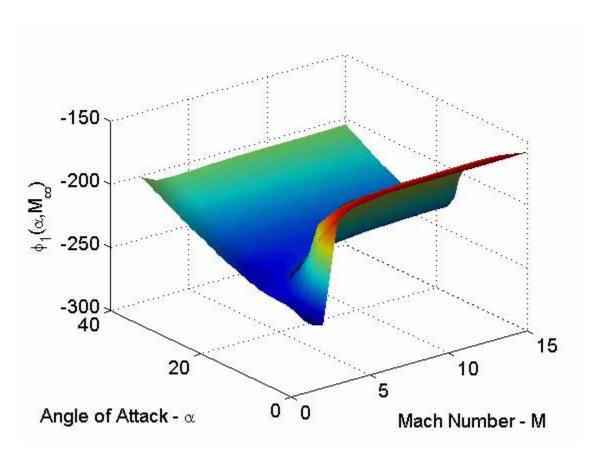
4.5 Output Information

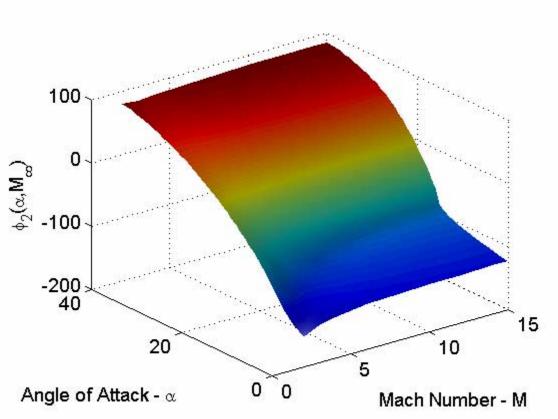
The output information consists of the following items:

- (1) Response surfaces of C_p and velocities for POD analysis (Plot files).
- (2) C_p and temperature for specified times in trajectory bulk data cards (Plot files).
- (3) Schematic plotting of trajectory related thermal thantities versus time for over every patch. These quantities include enthalpy-based heat transfer coefficient, adiabatic wall enthalpy, and pressure.
- (4) Thickness of every design layer and objective function value for every iteration.
- (5) Schematic plotting of optimal thickness and maximum temperature for over each layer for every patch.
- (6) Optimal thickness over each layer for every panel (Plot file).

4.6 Results

The outputted items listed in Section 4.5 have been stored in a text file and some plotting files. The test file is the Standard Output File (WEDGE_TPS.OUT) which includes all the input information from the Standard Input File (WEDGE_TPS.INP) and items (3)-(5) listed in the above section. Figures 4.4-4.6 show the response surfaces of Cp, Cp specified in trajectory bulk data card, and the optimal thickness, respectively.





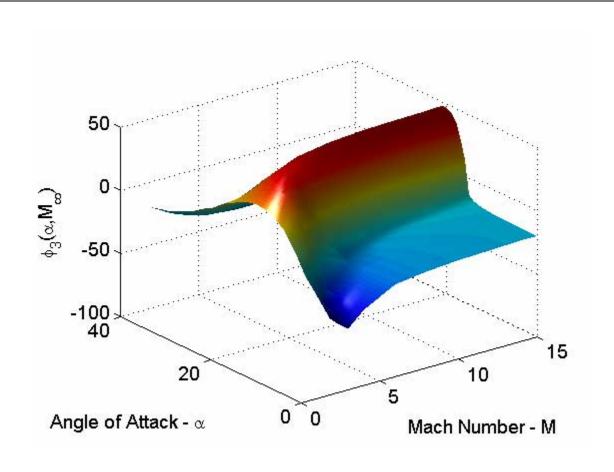
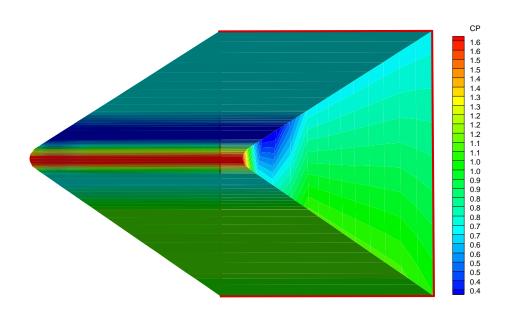


Figure 4.4. Response surfaces of first three modes for POD analysis directly using CFD results



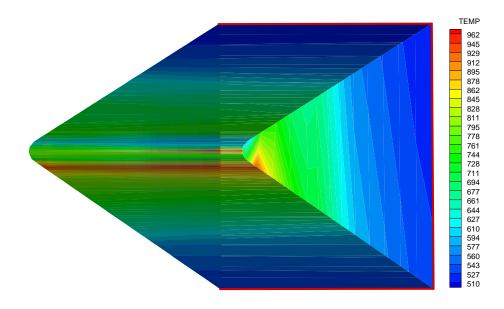
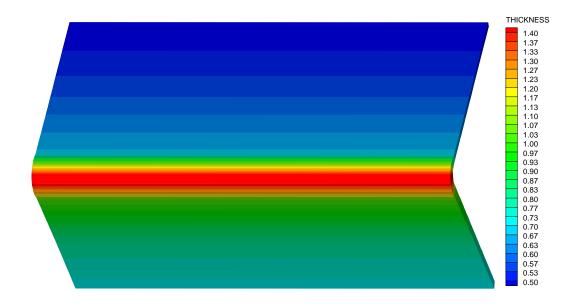


Figure 4.5. Plots of C_p and temperature at time=225 seconds (M=8.8, AoA=10.2)



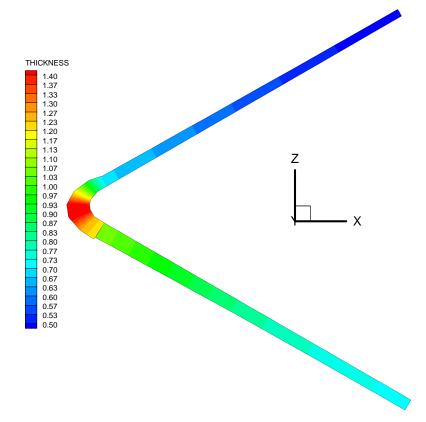


Figure 4.6. Optimal thickness plot

4.7 Lists of Input and Output Files

• Input Data Listing:

Listing 4.1 Standard input File: WEDGE_TPS.INP

```
ASSIGN AEROBASE='CFDTABLE.DAT',PRINT=0
$DIAG 1,2,3
SOL 1
$ Begin Executive Control Section
CEND
ECHO = SORT
SUBCASE = 1
        SUBTITLE=BENT-NOSE BODY AT MACH 10.5, AoA=0.0 Degrees
        LABEL= HYPERSONIC AERODYNAMIC ANALYSIS
        TPSDES=1
BEGIN BULK
                                       NASTRAN AEROMESH.NAS
PLTAERO 1
               YES
                       NO
$ POLTTING TPS THICKNESS
                               TECPLOT WEDGELAYED.PLT -1.0
PLTTPS
               1
                       ALL
PLTTPS
       -2
                       ALL
                               TECPLOT WEDGESINGL.PLT -1.0
      STREAM 1.E-6
PARAM
$PODRSM | TPSDES | METHOD | NRDMOD | TOLER | NEURON | SAVE
```

```
PODRSM 1
             1
                                               SAVE
                                                       WEDGE30.RST
                                                                      CONT
CONT
       CPPODRSM.P3D
                       UPODRSM.P3D
                                        VPODRSM.P3D
                                                       WPODRSM.P3D
$TPSDES SETID
               TPSSYM
               1
TPSDES 1
                       1
                              1
                                                                      CONT
CONT
       1
               2
                       3
$TPSSYM SETID
               IDPATCH NLAYER PRVAL MSGOUT
TPSSYM 1
                1
                        6
                                                                      CONT
CONT
       1
                1
                       0.008
                               0.05
                                                                      CONT
CONT
       1
                2
                       0.5
                               4.0
                                                                      CONT
CONT
       1
                3
                       0.01
                               0.1
                                                                      CONT
CONT
                4
                       0.015
                               0.2
                                                                      CONT
CONT
                5
                       0.01
                               0.1
                                                                      CONT
CONT
       0
                6
                       0.02
                               0.2
TPSSYM
       2
                2
                        6
                                                                      CONT
CONT
       2
                31
                       0.005
                               0.1
                                                                      CONT
CONT
       2
                32
                       0.005
                               0.1
                                                                      CONT
CONT
                33
                       0.3
                               5.0
                                                                      CONT
CONT
        2
                34
                       0.02
                               1.0
                                                                      CONT
CONT
                35
                       0.01
                               0.8
                                                                      CONT
CONT
       0
                36
                       0.01
                               1.0
TPSSYM 3
                3
                        6
                                                                      CONT
CONT
       3
                1
                       0.008
                               0.05
                                                                      CONT
CONT
                2
                       0.5
                               4.0
                                                                      CONT
CONT
                3
                       0.01
                               0.1
                                                                      CONT
CONT
                4
                       0.015
                               0.2
                                                                      CONT
CONT
                5
                       0.01
                               0.1
                                                                      CONT
CONT
                       0.02
                               0.2
$ TILE TPS (Based on First of Fig10 of Chiu adn Pitts paper, 1991)
                                                                      CONT
CONT
STTYPE 2
                       501
                                                                      CONT
CONT
       1.0
STTYPE 3
                6
                       245
                                                                      CONT
CONT
       0.01
STTYPE
       4
                       313
                                                                      CONT
CONT
       0.05
STTYPE
                       245
                                                                      CONT
       0.01
STTYPE 6
                       103
                                                                      CONT
CONT
       0.1
$ AFRSI TPS (Based on Fig7 of Myers report, 2000)
STTYPE 31
                                                                      CONT
CONT
       0.02
STTYPE 32
                                                                      CONT
CONT
       0.02
STTYPE 33
CONT
STTYPE 34
                                                                      CONT
CONT
       0.15
STTYPE 35
CONT
STTYPE 36
                                                                      CONT
CONT
       0.1
PRVAL
                       30000000
$PATCH ID
               RHSPAN RHSHOT LHSPAN LHSHOT
                                                                             $
PATCH 1
               11
$DESVAR ID
                       ME
DESVAR 1
                6
                       1
                                                                      CONT
       IE1
               IE2
                       IE3
                               IE4
                                      IE5
                                              IE6
                                                      IE7
                                                              IE8
                                            16
                                                    17
PANLST2 11
                                     15
                                                                    19
PANLST2
                                    15
                                            16
PATCH 2
$DESVAR ID
                       ME
                3
                                                                      CONT
DESVAR 2
CONT
                       13
                                                                      CONT
       IE1
               IE2
                                      IE5
                                              IE6
                                                      IE7
PANLST2
                                  THRU
PANLST2
                                             13
PATCH 3
```

```
$DESVAR ID
                NE
                        ME
DESVAR 3
                 3
                        1
                                                                           CONT
CONT
        20
                 26
                         32
PANLST2
            31
                               2.0
                                     THRU
                                                32
PANLST2
            32
                               20
                                       26
                                                32
$TRJLST SETID
TRJLST 1
                                                                           CONT
CONT
        1
                1
        TRAJCT
               FACT
                        TRAJCT FACT
                                         TRAJCT FACT
                                                          TRAJCT FACT
Ś
                MACH
                         ALTH
                                 AOA
                                         BETA
                                                  FORM
                                                          FILE1 FILE1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
TRAJCT
                                                                           CONT
        .00000E0 0.71871.45600E6 4.0000
CONT
                                                                           CONT
CONT
        .16000E2 0.98944.41990E6 14.0000
                                                                           CONT
        .33000E2 1.34826.43688E6 9.4208
                                                                           CONT
CONT
CONT
        .49000E2 1.63429.58196E6
                                                                           CONT
                                                  TECPLOT CPTEMP1.PLT
CONT
        .68000E2 2.17754.82141E6
                                  3.6000
                                                                           CONT
                                   3.6000
CONT
        .88000E2 2.99306.11358E7
                                                                           CONT
CONT
        .10800E3 4.03065.14897E7 3.6000
                                                                           CONT
CONT
        .12800E3 5.30536.18668E7
                                                                           CONT
                                  3.6000
CONT
        .14700E3 7.18387.22489E7 8.7000
                                                                           CONT
CONT
        .16500E3 8.14718.26307E7 10.2250
                                                                           CONT
CONT
        .18500E3 8.48577.29382E7 10.2250
                                                                           CONT
CONT
        .20500E3 8.73075.31108E7 10.2250
                                                                           CONT
CONT
        .22500E3 8.80061.31479E7 10.2250
                                                 TECPLOT CPTEMP2.PLT
                                                                           CONT
CONT
        .24500E3 8.62765.30495E7 10.2250
                                                                           CONT
CONT
        .26300E3 8.35804.28476E7 30.0000
                                                                           CONT
CONT
        .28300E3 7.92715.25083E7 30.0000
                                                                           CONT
        .30300E3 7.42020.20828E7 30.0000
CONT
                                                                           CONT
CONT
        .32300E3 6.98630.17006E7 30.0000
                                                                           CONT
CONT
        .34100E3 6.51451.15705E7 17.6576
                                                                           CONT
CONT
        .35900E3 6.29482.15555E7 11.3822
                                                                           CONT
CONT
        .37900E3 6.12626.15505E7 11.5945
                                                                           CONT
CONT
        .39900E3 5.96248.15405E7 11.6852
                                                                           CONT
CONT
        .41900E3 5.80340.15256E7 11.6316
                                                                           CONT
CONT
        .43900E3 5.64886.15063E7 11.4712
                                                                           CONT
        .45900E3 5.49856.14827E7 11.2120
CONT
                                                                           CONT
CONT
        .47900E3 5.35216.14551E7 10.8676
                                                                           CONT
CONT
        .49900E3 5.20938.14237E7 10.4565
                                                                           CONT
CONT
        .51900E3 5.06993.13890E7
                                                                           CONT
        .53900E3 4.92935.13511E7
CONT
                                                                           CONT
        .55900E3 4.78106.13103E7
CONT
                                                                           CONT
CONT
        .57900E3 4.62119.12670E7
                                                                           CONT
CONT
        .59900E3 4.44764.12216E7
                                   7.6847
                                                                           CONT
CONT
        .61900E3 4.25902.11747E7
                                                                           CONT
CONT
        .63900E3 4.05448.11267E7
                                                                           CONT
        .65900E3 3.82413.10782E7
CONT
                                                                           CONT
CONT
        .67900E3 3.56631.10300E7
                                                                           CONT
        .69900E3 3.28723.98254E6
CONT
                                   5.7202
                                                                           CONT
CONT
        .71759E3 3.00000.93312E6
                                                  TECPLOT CPTEMP3.PLT
                                                                           CONT
CONT
        .73600E3 2.68846.87329E6
                                                                           CONT
        .75600E3 2.29065.80146E6
CONT
                                                                           CONT
CONT
        .77600E3 1.86649.72891E6
                                                                           CONT
CONT
        .79600E3 1.47000.66074E6
                                                                           CONT
CONT
        .81600E3 1.14676.59940E6
                                   3.3054
                                                                           CONT
        .83600E3 0.96665.54315E6
CONT
                                                                           CONT
CONT
        .85600E3 0.86983.48792E6
                                                                           CONT
        .87400E3 0.80178.43914E6
CONT
                                                                           CONT
CONT
        .89400E3 0.73186.38870E6
                                                                           CONT
CONT
        .91400E3 0.67432.34157E6
                                                                           CONT
CONT
        .93400E3 0.62713.29712E6
                                                                           CONT
CONT
        .95400E3 0.58784.25488E6
                                   3.9046
                                                                           CONT
CONT
        .97400E3 0.55190.21464E6
                                                                           CONT
CONT
        .99400E3 0.51899.17633E6
                                                                           CONT
        .10140E4 0.48941.13984E6
                                                                           CONT
CONT
        .10340E4 0.46307.10502E6
                                                                           CONT
CONT
        .10540E4 0.43975.71741E5
                                   3.7895
                                                                           CONT
                                   3.7718
CONT
        .10740E4 0.41915.39891E5
                                                                           CONT
CONT
        .10940E4 0.40098.93915E4
                                   3.7458
          TIME
                   MACH
                           ALTH
                                    AOA
                                            BETA
                                                             Q
                                                                     R
$THERMPR|SETID |TEMP
                        |HOTWALL|TRANS |GAS
                                                  EMMS
                                                         THERMPR 1
ENDDATA
```

Listing 4.2 Control Table File: CFDTABLE.DAT

A WED	GE PROBLEM W	ITH 30 DEG O	PENING ANGLE										
REFC	REFB	REFS	REFX	REFY	REFZ	NO AESURFZ		MASS UNIT					
2.0231E+01 MACH	1.0000E+00 H	1.0000E+00 ALPHA	0.0000E+00 BETA	0.0000E+00 PRATE	0.0000E+00 ORATE	0 RRATE	IN CD	SLIN CY	CL	CR	CM	CN	FILE
2.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.2154E-04			-1.3663E+01	2.0929E+04THERM0	
3.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-3.4213E-04			-1.8299E+01	1.6918E+04THERM0	
4.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-4.1446E-04			-1.8067E+01	1.4946E+04THERM0	
6.0000E+00 8.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-5.1848E-04 -5.1988E-04			-1.7478E+01 -1.7193E+01	1.3700E+04THERM0 1.3272E+04THERM0	
1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-5.1934E-04			-1.7049E+01	1.3073E+04THERM0	
1.2000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-5.6304E-04			-1.6966E+01	1.2966E+04THERM0	
1.4000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00					-1.6917E+01	1.2900E+04THERM0	
1.5000E+01 2.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00 0.0000E+00		-5.6451E-04			-1.6899E+01	1.2878E+04THERM0 2.0873E+04THERM0	
3.0000E+00	0.0000E+00	2.0000E+00 2.0000E+00	0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00		-4.8093E-04 -4.2905E-04			-5.8482E+01 -1.2328E+02	1.7174E+04THERM0	
4.0000E+00	0.0000E+00	2.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-4.4107E-04			-1.0724E+02	1.5105E+04THERM0	
6.0000E+00	0.0000E+00	2.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-4.5437E-04			-1.0111E+02	1.3846E+04THERM0	0013
8.0000E+00	0.0000E+00	2.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-4.6100E-04			-9.9627E+01	1.3415E+04THERM0	
1.0000E+01 1.2000E+01	0.0000E+00 0.0000E+00	2.0000E+00 2.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-4.4964E-04 -4.5693E-04			-9.9085E+01 -9.8859E+01	1.3221E+04THERM0 1.3119E+04THERM0	
1.4000E+01	0.0000E+00	2.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00					-9.8795E+01	1.3066E+04THERM0	
1.5000E+01	0.0000E+00	2.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-4.6656E-04			-9.8794E+01	1.3045E+04THERM0	
2.0000E+00	0.0000E+00	4.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-8.5129E-04			-1.0488E+02	2.0688E+04THERM0	
3.0000E+00 4.0000E+00	0.0000E+00 0.0000E+00	4.0000E+00 4.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-6.0923E-04			-2.2782E+02	1.8023E+04THERM0	
4.0000E+00 6.0000E+00	0.0000E+00	4.0000E+00 4.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-6.0818E-04 -6.3874E-04			-1.9722E+02 -1.8479E+02	1.5562E+04THERM0 1.4240E+04THERM0	
8.0000E+00	0.0000E+00	4.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-6.5148E-04			-1.8198E+02	1.3800E+04THERM0	
1.0000E+01	0.0000E+00	4.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-6.5651E-04	2.0244E+02	-4.0488E+03	-1.8099E+02	1.3584E+04THERM0	0024
1.2000E+01	0.0000E+00	4.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-6.6063E-04			-1.8054E+02	1.3494E+04THERM0	
1.4000E+01 1.5000E+01	0.0000E+00 0.0000E+00	4.0000E+00 4.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-6.6273E-04 -6.6387E-04			-1.8041E+02 -1.8039E+02	1.3422E+04THERM0 1.3421E+04THERM0	
2.0000E+01	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.0910E-03			-1.5651E+02	2.0329E+04THERM0	
3.0000E+00	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-9.5714E-04			-2.9116E+02	1.8615E+04THERM0	
4.0000E+00	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-7.6174E-04			-2.8926E+02	1.6327E+04THERM0	
6.0000E+00	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-7.9385E-04			-2.6864E+02	1.4865E+04THERM0	
8.0000E+00 1.0000E+01	0.0000E+00 0.0000E+00	6.0000E+00 6.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-8.0817E-04 -8.1621E-04			-2.6420E+02 -2.6259E+02	1.4388E+04THERM0 1.4176E+04THERM0	
1.2000E+01	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-8.2009E-04			-2.6189E+02	1.4065E+04THERM0	
1.4000E+01	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	6.9991E+02	-8.2188E-04	2.9445E+02	-5.8886E+03	-2.6160E+02	1.4003E+04THERM0	0035
1.5000E+01	0.0000E+00	6.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-8.2280E-04			-2.6156E+02	1.3981E+04THERM0	
2.0000E+00 3.0000E+00	0.0000E+00 0.0000E+00	8.0000E+00 8.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-1.1359E-03 -1.1461E-03			-2.1923E+02 -3.4944E+02	1.9813E+04THERM0 1.8978E+04THERM0	
4.0000E+00	0.0000E+00	8.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-9.1757E-04			-3.8573E+02	1.7545E+04THERM0	
6.0000E+00	0.0000E+00	8.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-9.4325E-04			-3.5294E+02	1.5746E+04THERM0	
8.0000E+00	0.0000E+00	8.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-9.5864E-04			-3.4614E+02	1.5236E+04THERM0	
1.0000E+01	0.0000E+00	8.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-9.6773E-04			-3.4367E+02	1.5014E+04THERM0	
1.2000E+01 1.4000E+01	0.0000E+00 0.0000E+00	8.0000E+00 8.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-9.7217E-04 -9.7454E-04			-3.4256E+02 -3.4205E+02	1.4892E+04THERM0 1.4829E+04THERM0	
1.5000E+01	0.0000E+00	8.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-9.7542E-04			-3.4194E+02	1.4811E+04THERMO	
2.0000E+00	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	9.7483E+02	-1.1034E-03	3.9256E+02	-7.8512E+03	-2.8576E+02	1.9497E+04THERM0	0046
3.0000E+00	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.2098E-03			-4.0264E+02	1.9350E+04THERM0	
4.0000E+00 6.0000E+00	0.0000E+00 0.0000E+00	1.0000E+01 1.0000E+01	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-1.1667E-03 -1.0887E-03			-4.4420E+02 -4.3877E+02	1.8846E+04THERM0 1.6929E+04THERM0	
8.0000E+00	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.1046E-03			-4.2818E+02	1.6333E+04THERM0	
1.0000E+01	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.1135E-03			-4.2431E+02	1.6107E+04THERM0	
1.2000E+01	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.1187E-03			-4.2253E+02	1.5975E+04THERM0	
1.4000E+01	0.0000E+00	1.0000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.1217E-03			-4.2169E+02	1.5875E+04THERM0	
1.5000E+01 2.0000E+00	0.0000E+00 0.0000E+00	1.0000E+01 1.1000E+01	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00		-1.1228E-03 -1.0730E-03			-4.2146E+02 -3.1738E+02	1.5852E+04THERM0 1.9438E+04THERM0	
3.0000E+00	0.0000E+00	1.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.2093E-03			-4.2722E+02	1.9546E+04THERM0	
4.0000E+00		1.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.2464E-03			-4.6631E+02	1.9214E+04THERM0	
6.0000E+00	0.0000E+00	1.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00		-1.1590E-03			-4.8317E+02	1.7686E+04THERM0	
8.0000E+00 1.0000E+01	0.0000E+00 0.0000E+00	1.1000E+01 1.1000E+01	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00		-1.1743E-03 -1.1827E-03			-4.6963E+02 -4.6469E+02	1.7000E+04THERM0 1.6746E+04THERM0	
1.0000E+01 1.2000E+01		1.1000E+01 1.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00						1.6575E+04THERMO	
													-

1.4000E+01 0.0000E+00 1.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 5.2448E+02 -1.1912E-03 5.1014E+02 -1.0203E+04 -4.6114E+02 1.6489E+04THERM0062 1.5000E+01 0.0000E+00 1.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.2307E+02 -1.1923E-03 5.0959E+02 -1.0192E+04 -4.6073E+02 1.6461E+04THERM0063 2.0000E+00 0.0000E+00 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.7140E+02 -1.0312E-03 4.6324E+02 -9.2648E+03 -3.4735E+02 1.9428E+04THERM0064 3.0000E+00 0.0000E+00 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 5.6729E+02 -1.1346E+04 -4.5034E+02 1.9762E+04THERM0065 $4.0000E + 00 \\ 0.0000E + 00 \\ 1.2000E + 01 \\ 0.0000E + 01 \\ 0.0000E + 01 \\ 0.0000E + 00 \\ 0.00$ 6.0000E+00 0.0000E+00 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.3097E+02 -1.2280E-03 5.9554E+02 -1.1911E+04 -5.2844E+02 1.8620E+04THERM0067 8.0000E+00 0.0000E+00 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 5.6621E+02 -1.1324E+04 -5.1183E+02 1.7767E+04THERM0068 1.0000E+01 0.0000E+00 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.7231E+02 -1.2491E-03 5.5714E+02 -1.1143E+04 -5.0553E+02 1.7447E+04THERM0069 1.2000E+01 0.0000E+00 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.6561E+02 -1.2547E-03 5.5351E+02 -1.1070E+04 -5.0249E+02 1.7311E+04THERM0070 1.4000E+01 0.0000E+00 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 5.594E+02 -1.2580E-03 5.5076E+02 -1.1015E+04 -5.0087E+02 1.7190E+04THERMO071 1.5000E+01 0.0000E+00 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.5792E+02 -1.2592E-03 5.5003E+02 -1.1001E+04 -5.0033E+02 1.7157E+04THERM0072 $2.0000E + 00 \quad 0.0000E + 00 \quad 1.3000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.7275E + 02 \quad -9.7912E - 04 \quad 4.9409E + 02 \quad -9.8818E + 03 \quad -3.7664E + 02 \quad 1.9455E + 04THERMOO73 \quad 0.0000E + 00 \quad 0.0000E$ 3.0000E+00 0.0000E+00 1.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.9935E+02 -1.1589E-03 5.8542E+02 -1.1708E+04 -4.7219E+02 1.9987E+04THERM0074 4.0000E+00 0.0000E+00 1.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.9426E+02 -1.2862E-03 6.1766E+02 -1.2353E+04 -5.0860E+02 1.9885E+04THERM0075 $6.0000E + 00 \quad 0.0000E + 00 \quad 1.3000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.7491E + 02 \quad -1.3182E - 03 \quad 6.3808E + 02 \quad -1.2762E + 04 \quad -5.4610E + 02 \quad 1.9498E + 04THERM0076 \quad 0.0000E + 00 \quad 0.0000E$ 8.0000E+00 0.0000E+00 1.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.3541E+02 -1.3049E-03 6.1438E+02 -1.2288E+04 -5.5536E+02 1.8707E+04THERM0077 1.0000E+01 0.0000E+00 1.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.1554E+02 -1.3125E-03 6.0096E+02 -1.2019E+04 -5.4718E+02 1.8310E+04THERM0078 1.2000E+01 0.0000E+00 1.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.0475E+02 -1.3176E-03 5.9452E+02 -1.1891E+04 -5.4330E+02 1.8094E+04THERM0079 1.4000E+01 0.0000E+00 1.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 5.9931E+02 -1.3211E-03 5.9138E+02 -1.1828E+04 -5.4112E+02 1.7985E+04THERM0080 1.5000E+01 0.0000E+00 1.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 5.9045E+02 -1.3224E-03 5.9036E+02 -1.1807E+04 -5.4041E+02 1.7950E+04THERM0081 2.0000E+00 0.0000E+00 1.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.7582E+02 -9.1516E-04 5.2236E+02 -1.0447E+04 -4.0488E+02 1.9516E+04THERM0082 3.0000E+00 0.0000E+00 1.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0112E+03 -1.1120E-03 6.0138E+02 -1.2028E+04 -4.9295E+02 2.0224E+04THERM0083 6.0000E+00 0.0000E+00 1.4000E+01 0.0000E+00 8.0000E+00 0.0000E+00 1.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.8841E+02 -1.3682E-03 6.6387E+02 -1.3277E+04 -5.8345E+02 1.9768E+04THERM0086 1.0000E+01 0.0000E+00 1.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.6645E+02 -1.3726E-03 6.4906E+02 -1.2981E+04 -5.8995E+02 1.9328E+04THERM0087 1.2000E+01 0.0000E+00 1.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.5357E+02 -1.3766E-03 6.3963E+02 -1.2793E+04 -5.8531E+02 1.9071E+047HERMO088 1.4000E+01 0.0000E+00 1.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.4659E+02 -1.3799E-03 6.3483E+02 -1.2697E+04 -5.8250E+02 1.8931E+04THERM0089 1.5000E+01 0.0000E+00 1.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.4426E+02 -1.3812E-03 6.3324E+02 -1.2665E+04 -5.8151E+02 1.8885E+04THERM0090 2.0000E+00 0.0000E+00 1.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 5.4865E+02 -1.0973E+04 -4.3207E+02 1.9602E+04THERM0091 $3.0000E+00 \quad 0.0000E+00 \quad 1.5000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.0230E+03 \quad -1.0507E-03 \quad 6.1607E+02 \quad -1.2320E+04 \quad -5.1269E+02 \quad 2.0465E+04THERM0092 \quad 0.0000E+00 \quad 0.00$ 4.0000E+00 0.0000E+00 1.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0266E+03 -1.2174E-03 6.4498E+02 -1.2898E+04 -5.4581E+02 2.0539E+04THERM0093 6.0000E+00 0.0000E+00 1.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0196E+03 -1.3678E-03 6.6833E+02 -1.3365E+04 -5.7489E+02 2.0400E+04THERM0094 8.0000E+00 0.0000E+00 1.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0146E+03 -1.4086E-03 6.7621E+02 -1.3522E+04 -5.8976E+02 2.0301E+04THERM0095 1.0000E+01 0.0000E+00 1.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0105E+03 -1.4255E-03 6.8101E+02 -1.3618E+04 -6.0052E+02 2.0219E+04THERM0096 1.2000E+01 0.0000E+00 1.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0077E+03 -1.4286E-03 6.8482E+02 -1.3693E+04 -6.1007E+02 2.0167E+04THERM0097 1.4000E+01 0.0000E+00 1.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0041E+03 -1.4346E-03 6.8450E+02 -1.3687E+04 -6.1907E+02 2.0094E+04THERM0098 1.5000E+01 0.0000E+00 1.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0010E+03 -1.4357E-03 6.8243E+02 -1.3645E+04 -6.2033E+02 2.0034E+04THERM0099 2.0000E+00 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 5.7252E+02 -1.1450E+04 -4.5824E+02 1.9728E+04THERM0100 3.0000E+00 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0365E+03 -9.7384E-04 6.2763E+02 -1.2553E+04 -5.3159E+02 2.0731E+04THERM0101 4.0000E+00 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0435E+03 -1.1541E-03 6.5365E+02 -1.3073E+04 -5.6271E+02 2.0870E+04THERM0102 6.0000E+00 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0404E+03 -1.3352E-03 6.7586E+02 -1.3517E+04 -5.8955E+02 2.0808E+04THERM0103 8.0000E+00 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0369E+03 -1.3990E-03 6.8445E+02 -1.3689E+04 -6.0177E+02 2.0738E+04THERM0104 1.0000E+01 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0342E+03 -1.4262E-03 6.8909E+02 -1.3782E+04 -6.0883E+02 2.0684E+04THERM0105 1.2000E+01 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0329E+03 -1.4419E-03 6.9137E+02 -1.3828E+04 -6.1345E+02 2.0658E+04THERM0106 1.4000E+01 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0329E+03 -1.4516E-03 6.9411E+02 -1.3882E+04 -6.1673E+02 2.0658E+04THERM0107 $1.5000{\pm}+01 \quad 0.0000{\pm}+00 \quad 1.6000{\pm}+01 \quad 0.0000{\pm}+01 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 1.0326{\pm}+03 \quad -1.4555{\pm}-03 \quad 6.9479{\pm}+02 \quad -1.3896{\pm}+04 \quad -6.1803{\pm}+02 \quad 2.0652{\pm}+04THERM0108$ 2.0000E+00 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.9471E+02 -6.3279E-04 5.9379E+02 -1.1876E+04 -4.8338E+02 1.9895E+04THERM0109 3.0000E+00 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.0498E+03 -8.7932E-04 6.3813E+02 -1.2763E+04 -5.4970E+02 2.0995E+04THERM0110 4.0000E+00 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0599E+03 -1.0733E-03 6.6104E+02 -1.3221E+04 -5.7862E+02 2.1198E+04THERM0111 6.0000E+00 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0604E+03 -1.2728E-03 6.8147E+02 -1.3629E+04 -6.0336E+02 2.1209E+04THERM0112 8.0000E+00 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0585E+03 -1.3550E-03 6.8971E+02 -1.3794E+04 -6.1403E+02 2.1169E+04THERM0113 1.0000E+01 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0569E+03 -1.3924E-03 6.9396E+02 -1.3879E+04 -6.1972E+02 2.1137E+04THERM0114 1.2000E+01 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0560E+03 -1.4123E-03 6.9633E+02 -1.3927E+04 -6.2317E+02 2.1119E+04THERM0115 1.4000E+01 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0554E+03 -1.4240E-03 6.9790E+02 -1.3958E+04 -6.2542E+02 2.1107E+04THERM0116 1.5000E+01 0.0000E+00 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0552E+03 -1.4285E-03 6.9849E+02 -1.3970E+04 -6.2627E+02 2.1102E+04THERM0117 2.0000E+00 0.0000E+00 1.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0034E+03 -4.9913E-04 6.1339E+02 -1.2268E+04 -5.0753E+02 2.0068E+04THERM0118 3.0000E+00 0.0000E+00 1.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0633E+03 -7.6415E-04 6.4719E+02 -1.2944E+04 -5.6713E+02 2.1266E+04THERM0119 $4.0000E+00 \quad 0.0000E+00 \quad 1.8000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.0767E+03 \quad -9.7329E-04 \quad 6.6631E+02 \quad -1.3326E+04 \quad -5.9373E+02 \quad 2.1532E+04THERM0120 \quad 0.0000E+00 \quad 0.000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.000E+00 \quad 0.0000E+00 \quad 0.0000$ 8.0000E+00 0.0000E+00 1.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0793E+03 -1.2790E-03 6.9237E+02 -1.3848E+04 -6.2581E+02 2.1584E+04THERM0122 1.0000E+01 0.0000E+00 1.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0786E+03 -1.3244E-03 6.9586E+02 -1.3918E+04 -6.3068E+02 2.1571E+04THERM0123 1.2000E+01 0.0000E+00 1.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0783E+03 -1.3495E-03 6.9786E+02 -1.3957E+04 -6.3354E+02 2.1565E+04THERM0124 1.4000E+01 0.0000E+00 1.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0781E+03 -1.3646E-03 6.9912E+02 -1.3983E+04 -6.3538E+02 2.1562E+04THERM0125 2.0000E+00 0.0000E+00 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0130E+03 -3.3799E-04 6.3098E+02 -1.2620E+04 -5.3072E+02 2.0260E+04THERM0127 3.0000E+00 0.0000E+00 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0775E+03 -6.2415E-04 6.5443E+02 -1.3089E+04 -5.8396E+02 2.1551E+04THERM0128 $4.0000E+00 \quad 0.0000E+00 \quad 1.9000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.0930E+03 \quad -8.5120E-04 \quad 6.7034E+02 \quad -1.3407E+04 \quad -6.0816E+02 \quad 2.1860E+04THERM0129 \quad -0.0000E+00 \quad 0.0000E+00 \quad 0.0$

6.0000E+00 0.0000E+00 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0991E+03 -1.0791E-03 6.8589E+02 -1.3718E+04 -6.2874E+02 2.1983E+04THERM0130 8.0000E+00 0.0000E+00 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1000E+03 -1.1775E-03 6.9230E+02 -1.3846E+04 -6.3712E+02 2.1999E+04THERM0131 1.0000E+01 0.0000E+00 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1001E+03 -1.2271E-03 6.9543E+02 -1.3909E+04 -6.4131E+02 2.2002E+04THERM0132 1.2000E+01 0.0000E+00 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0999E+03 -1.2551E-03 6.9740E+02 -1.3949E+04 -6.4374E+02 2.1996E+04THERM0133 1.4000E+01 0.0000E+00 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1001E+03 -1.2723E-03 6.9830E+02 -1.3967E+04 -6.4528E+02 2.2001E+04THERM0134 1.5000E+01 0.0000E+00 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1001E+03 -1.2786E-03 6.9879E+02 -1.3976E+04 -6.4587E+02 2.2001E+04THERM0135 2.0000E+00 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.0239E+03 -1.4266E-04 6.4648E+02 -1.2930E+04 -5.5296E+02 2.0478E+04THERM0136 3.0000E+00 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0917E+03 -4.5389E-04 6.6071E+02 -1.3214E+04 -6.0023E+02 2.1834E+04THERM0137 $4.0000E+00 \\ 0.0000E+01 \\ 0.0000E+01 \\ 0.0000E+01 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 1.1095E+03 \\ -7.0237E-04 \\ 6.7274E+02 \\ -1.3455E+04 \\ -6.2204E+02 \\ 2.2190E+04THERM0138 \\ -1.204E+02 \\ -1.2$ 6.0000E+00 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1182E+03 -9.4793E-04 6.8502E+02 -1.3700E+04 -6.4057E+02 2.2365E+04THERM0139 $8.0000E + 00 \\ 0.0000E + 01 \\ 0.0000E + 01 \\ 0.0000E + 01 \\ 0.0000E + 01 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.1199E + 03 \\ -1.0522E - 03 \\ 6.9046E + 02 \\ -1.3810E + 04 \\ -6.4796E + 02 \\ 2.2396E + 04THERMO140 \\ 0.0000E + 00 \\ 0.0000E$ 1.0000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1204E+03 -1.1047E-03 6.9324E+02 -1.3866E+04 -6.5161E+02 2.2406E+04THERM0141 1.2000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1209E+03 -1.1345E-03 6.9457E+02 -1.3891E+04 -6.5371E+02 2.2418E+04THERM0142 1.4000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1211E+03 -1.1529E-03 6.9561E+02 -1.3912E+04 -6.5502E+02 2.2421E+04THERM0143 1.5000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1211E+03 -1.1596E-03 6.9602E+02 -1.3921E+04 -6.5552E+02 2.2421E+04THERM0144 $2.0000E+00 \quad 0.0000E+00 \quad 2.1000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.0356E+03 \quad 9.7463E-05 \quad 6.6020E+02 \quad -1.3204E+04 \quad -5.7430E+02 \quad 2.0713E+04THERM0145 \quad 0.0000E+00 \quad 0.000$ $3.0000E+00 \quad 0.0000E+00 \quad 2.1000E+01 \quad 0.0000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.1063E+03 \quad -2.4425E-04 \quad 6.6539E+02 \quad -1.3308E+04 \quad -6.1600E+02 \quad 2.2127E+04THERM0146 \quad -0.0000E+00 \quad 0.0000E+00 \quad 0.0$ 4.0000E+00 0.0000E+00 2.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1261E+03 -5.2135E-04 6.7369E+02 -1.3474E+04 -6.3545E+02 2.2523E+04THERM0147 6.0000E+00 0.0000E+00 2.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1367E+03 -7.8865E-04 6.8296E+02 -1.3661E+04 -6.5194E+02 2.2731E+04THERM0148 8.0000E+00 0.0000E+00 2.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1394E+03 -9.0053E-04 6.8730E+02 -1.3747E+04 -6.5844E+02 2.2787E+04THERM0149 1.0000E+01 0.0000E+00 2.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1403E+03 -9.5631E-04 6.8919E+02 -1.3785E+04 -6.6162E+02 2.2803E+04THERM0150 1.2000E+01 0.0000E+00 2.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1407E+03 -9.8782E-04 6.9049E+02 -1.3811E+04 -6.6340E+02 2.2812E+04THERM0151 1.4000E+01 0.0000E+00 2.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1409E+03 -1.0072E-03 6.9139E+02 -1.3829E+04 -6.6455E+02 2.2814E+04THERM0152 1.5000E+01 0.0000E+00 2.1000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.1413E+03 -1.0143E-03 6.9165E+02 -1.3833E+04 -6.6498E+02 2.2825E+04THERM0153 2.0000E+00 0.0000E+00 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0477E+03 3.9014E-04 6.7244E+02 -1.3449E+04 -5.9476E+02 2.0954E+04THERM0154 $3.0000E+00 \quad 0.0000E+00 \quad 2.2000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.1213E+03 \quad 1.4468E-05 \quad 6.6878E+02 \quad -1.3375E+04 \quad -6.3127E+02 \quad 2.2426E+04THERM0155E+00 \quad -1.0000E+00 \quad 0.0000E+00 \quad$ 4.0000E+00 0.0000E+00 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1426E+03 -2.9846E-04 6.7345E+02 -1.3469E+04 -6.4843E+02 2.2852E+04THERMO156 6.0000E+00 0.0000E+00 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1553E+03 -5.9526E-04 6.7935E+02 -1.3587E+04 -6.6296E+02 2.3106E+04THERM0157 8.0000E+00 0.0000E+00 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1587E+03 -7.1661E-04 6.8254E+02 -1.3651E+04 -6.6863E+02 2.3174E+04THERM0158 1.0000E+01 0.0000E+00 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1599E+03 -7.7673E-04 6.8424E+02 -1.3666E+04 -6.7135E+02 2.3197E+04THERNOL59 1.2000E+01 0.0000E+00 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1605E+03 -8.1058E-04 6.8527E+02 -1.3707E+04 -6.7288E+02 2.3207E+04THERM0160 1.4000E+01 0.0000E+00 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1611E+03 -8.3132E-04 6.8587E+02 -1.3718E+04 -6.7386E+02 2.3221E+04THERM0161 1.5000E+01 0.0000E+00 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1612E+03 -8.3887E-04 6.8616E+02 -1.3724E+04 -6.7424E+02 2.3223E+04THERM0162 2.0000E+00 0.0000E+00 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0610E+03 4.7185E-04 6.8253E+02 -1.3650E+04 -6.1437E+02 2.1221E+04THERM0163 $3.0000E + 00 \quad 0.0000E + 00 \quad 2.3000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.1361E + 03 \quad 3.2321E - 04 \quad 6.7102E + 02 \quad -1.3420E + 04 \quad -6.4606E + 02 \quad 2.2723E + 04THERM0164 \quad 0.0000E + 00 \quad 0.000E + 00 \quad 0.0000E +$ 4.0000E+00 0.0000E+00 2.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1595E+03 -2.1769E-05 6.7156E+02 -1.3431E+04 -6.6106E+02 2.3190E+04THERM0165 6.0000E+00 0.0000E+00 2.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.1731E+03 -3.5897E-04 6.7515E+02 -1.3503E+04 -6.7368E+02 2.3462E+04THERM0166 8.0000E+00 0.0000E+00 2.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1771E+03 -4.9395E-04 6.7728E+02 -1.3545E+04 -6.7856E+02 2.3542E+04THERM0167 1.0000E+01 0.0000E+00 2.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1788E+03 -5.5961E-04 6.7835E+02 -1.3567E+04 -6.8089E+02 2.3575E+04THERM0168 1.2000E+01 0.0000E+00 2.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1796E+03 -5.9640E-04 6.7903E+02 -1.3580E+04 -6.8219E+02 2.3593E+04THERM0169 1.4000E+01 0.0000E+00 2.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1799E+03 -6.1888E-04 6.7964E+02 -1.3596E+04 -6.8302E+02 2.3589E+04THERM0170 1.5000E+01 0.0000E+00 2.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1804E+03 -6.2698E-04 6.7970E+02 -1.3594E+04 -6.8334E+02 2.3610E+04THERM0171 2.0000E+00 0.0000E+00 2.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0742E+03 6.9263E-05 6.9147E+02 -1.3830E+04 -6.3316E+02 2.1484E+04THERM0172 $3.0000E + 00 \quad 0.0000E + 00 \quad 2.4000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.1516E + 03 \quad 2.8734E - 04 \quad 6.7166E + 02 \quad -1.3433E + 04 \quad -6.6038E + 02 \quad 2.3034E + 04THERM0173E + 0.0000E + 00 \quad 0.0000E$ $4.0000E+00 \quad 0.0000E+00 \quad 2.4000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.1755E+03 \quad 2.9040E-04 \quad 6.6951E+02 \quad -1.3390E+04 \quad -6.7331E+02 \quad 2.3512E+04THERM0174 \quad -0.0000E+00 \quad 0.0000E+00 \quad 0.00$ $6.0000E + 00 \quad 0.0000E + 00 \quad 2.4000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.1905E + 03 \quad -6.5154E - 05 \quad 6.7024E + 02 \quad -1.3404E + 04 \quad -6.8414E + 02 \quad 2.3812E + 04THERM0175 + 0.0000E + 00 \quad 0.000E + 00 \quad 0.0000E 00 \quad 0.0000E +$ $8.0000E + 00 \quad 0.0000E + 00 \quad 2.4000E + 01 \quad 0.0000E + 01 \quad 0.0000E + 00 \quad 0.000E + 00 \quad 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0$ 1.0000E+01 0.0000E+00 2.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1970E+03 -2.9324E-04 6.7162E+02 -1.3433E+04 -6.9025E+02 2.3938E+04THERM0177 1.2000E+01 0.0000E+00 2.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1980E+03 -3.3471E-04 6.7196E+02 -1.3439E+04 -6.9134E+02 2.3960E+04THERM0178 1.4000E+01 0.0000E+00 2.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1988E+03 -3.6015E-04 6.7218E+02 -1.3443E+04 -6.9204E+02 2.3976E+04THERM0179 1.5000E+01 0.0000E+00 2.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1991E+03 -3.6923E-04 6.7229E+02 -1.3446E+04 -6.9231E+02 2.3981E+04THERM0180 2.0000E+00 0.0000E+00 2.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.0883E+03 -4.2416E-04 6.9856E+02 -1.3971E+04 -6.5116E+02 2.1766E+04THERM0181 $3.0000E + 00 \quad 0.0000E + 00 \quad 2.5000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.1667E + 03 \quad -2.2441E - 04 \quad 6.7153E + 02 \quad -1.3430E + 04 \quad -6.7424E + 02 \quad 2.3335E + 04THERM0182$ $4.0000E+00 \quad 0.0000E+00 \quad 2.5000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.1916E+03 \quad 1.4193E-04 \quad 6.6610E+02 \quad -1.3321E+04 \quad -6.8524E+02 \quad 2.3834E+04THERM0183 \quad -1.4193E-04 \quad -1$ 6.0000E+00 0.0000E+00 2.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2078E+03 2.4604E-04 6.6403E+02 -1.3282E+04 -6.9439E+02 2.4154E+04THERM0184 8.0000E+00 0.0000E+00 2.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.2130E+03 1.1904E-04 6.6370E+02 -1.3274E+04 -6.9785E+02 2.4260E+04THERM0185 1.0000E+01 0.0000E+00 2.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2150E+03 3.7606E-05 6.6384E+02 -1.3278E+04 -6.9947E+02 2.4299E+04THERM0186 1.2000E+01 0.0000E+00 2.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2162E+03 -1.0002E-05 6.6396E+02 -1.3278E+04 -7.0037E+02 2.4325E+04THERM0187 1.4000E+01 0.0000E+00 2.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2170E+03 -3.9470E-05 6.6406E+02 -1.3282E+04 -7.0095E+02 2.4338E+04THERM0188 1.5000E+01 0.0000E+00 2.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2172E+03 -5.0107E-05 6.6417E+02 -1.3282E+04 -7.0118E+02 2.4346E+04THERM0189 $2.0000E+00 \quad 0.0000E+00 \quad 2.6000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.1024E+03 \quad -7.9527E-04 \quad 7.0447E+02 \quad -1.4089E+04 \quad -6.6842E+02 \quad 2.2048E+04THERM01900E+00 \quad 0.0000E+00 \quad$ $3.0000E+00 \quad 0.0000E+00 \quad 2.6000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.1817E+03 \quad -6.7678E-04 \quad 6.7028E+02 \quad -1.3405E+04 \quad -6.8763E+02 \quad 2.3636E+04THERM0191 \quad -0.0000E+00 \quad 0.0000E+00 \quad 0.0$ 4.0000E+00 0.0000E+00 2.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.2076E+03 -3.9915E-04 6.6170E+02 -1.3234E+04 -6.9685E+02 2.4153E+04THERM0192 6.0000E+00 0.0000E+00 2.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2246E+03 3.1916E-06 6.5702E+02 -1.3142E+04 -7.0444E+02 2.4489E+04THERM0193 $8.0000E + 00 \\ 0.0000E 00 \\ 0.0000E 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.000E + 00 \\ \phantom{0$ 1.0000E+01 0.0000E+00 2.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2326E+03 1.9496E-04 6.5528E+02 -1.3107E+04 -7.0857E+02 2.4648E+04THERM0195 1.2000E+01 0.0000E+00 2.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2338E+03 2.0492E-04 6.5512E+02 -1.3101E+04 -7.0928E+02 2.4680E+04THERM0196 1.4000E+01 0.0000E+00 2.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2345E+03 2.0549E-04 6.5513E+02 -1.3105E+04 -7.0975E+02 2.4685E+04THERM0197

1.5000E+01 0.0000E+00 2.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2349E+03 2.0458E-04 6.5510E+02 -1.3100E+04 -7.0994E+02 2.4703E+04THERM0198 2.0000E+00 0.0000E+00 2.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1171E+03 -1.0600E-03 7.0868E+02 -1.4173E+04 -6.8496E+02 2.2343E+04THERM0199 3.0000E+00 0.0000E+00 2.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1970E+03 -9.8750E-04 6.6780E+02 -1.3355E+04 -7.0057E+02 2.3942E+04THERM0200 4.0000E+00 0.0000E+00 2.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2234E+03 -8.1348E-04 6.5640E+02 -1.3128E+04 -7.0814E+02 2.4468E+04THERMO201 $6.0000E + 00 \quad 0.0000E + 00 \quad 2.7000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.2412E + 03 \quad -5.3812E - 04 \quad 6.4922E + 02 \quad -1.2986E + 04 \quad -7.1428E + 02 \quad 2.4820E + 04THERMO2020E + 0.000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0$ 8.0000E+00 0.0000E+00 2.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2468E+03 -3.8309E-04 6.4721E+02 -1.2943E+04 -7.1650E+02 2.4940E+04THERM0203 1.0000E+01 0.0000E+00 2.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2494E+03 -2.9756E-04 6.4632E+02 -1.2928E+04 -7.1753E+02 2.4985E+04THERM0204 1.2000E+01 0.0000E+00 2.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2507E+03 -2.4782E-04 6.4592E+02 -1.2917E+04 -7.1809E+02 2.5017E+04THERM0205 1.4000E+01 0.0000E+00 2.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2518E+03 -2.1701E-04 6.4542E+02 -1.2910E+04 -7.1847E+02 2.5033E+04THERM0206 1.5000E+01 0.0000E+00 2.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2520E+03 -2.0594E-04 6.4543E+02 -1.2907E+04 -7.1862E+02 2.5044E+04THERM0207 $2.0000E + 00 \\ 0.0000E + 00 \\ 2.8000E + 01 \\ 0.0000E + 01 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.0000E + 00 \\ 0.1324E + 03 \\ -1.2494E - 03 \\ 0.1324E + 03 \\ -1.2494E - 03 \\ 0.1324E + 03 \\ 0.000E + 01 \\ 0.000E + 00 \\ 0.000E + 0$ $3.0000E+00 \quad 0.0000E+00 \quad 2.8000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.2122E+03 \quad -1.1993E-03 \quad 6.6423E+02 \quad -1.3284E+04 \quad -7.1307E+02 \quad 2.4245E+04THERM02099 \quad 0.0000E+00 \quad 0.0$ 4.0000E+00 0.0000E+00 2.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2391E+03 -1.0892E-03 6.5004E+02 -1.3000E+04 -7.1910E+02 2.4783E+04THERM0210 6.0000E+00 0.0000E+00 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2574E+03 -9.1964E-04 6.4060E+02 -1.2814E+04 -7.2392E+02 2.5143E+04THERM0211 8.0000E+00 0.0000E+00 2.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2633E+03 -8.2417E-04 6.3768E+02 -1.2751E+04 -7.2561E+02 2.5271E+04THERM0212 $1.0000E + 01 \quad 0.0000E + 00 \quad 2.8000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.2658E + 03 \quad -7.7014E - 04 \quad 6.3647E + 02 \quad -1.2734E + 04 \quad -7.2637E + 02 \quad 2.5309E + 04THERM0213$ 1.2000E+01 0.0000E+00 2.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2674E+03 -7.3792E-04 6.3573E+02 -1.2712E+04 -7.2678E+02 2.5353E+04THERM0214 1.4000E+01 0.0000E+00 2.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2683E+03 -7.1747E-04 6.3535E+02 -1.2710E+04 -7.2706E+02 2.5361E+04THERM0215 1.5000E+01 0.0000E+00 2.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2686E+03 -7.1008E-04 6.3529E+02 -1.2703E+04 -7.2718E+02 2.5377E+04THERM0216 2.0000E+00 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1477E+03 -1.3781E-03 7.1270E+02 -1.4253E+04 -7.1603E+02 2.2955E+04THERM0217 3.0000E+00 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2275E+03 -1.3368E-03 6.5947E+02 -1.3189E+04 -7.2512E+02 2.4549E+04THERM0218 4.0000E+00 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.2548E+03 -1.2705E-03 6.4237E+02 -1.2848E+04 -7.2975E+02 2.5096E+04THERM0219 6.0000E+00 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2733E+03 -1.1675E-03 6.3127E+02 -1.2623E+04 -7.3334E+02 2.5470E+04THERM0220 8.0000E+00 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.2795E+03 -1.1097E-03 6.2735E+02 -1.2550E+04 -7.3454E+02 2.5585E+04THERM0221 1.0000E+01 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2822E+03 -1.0772E-03 6.2569E+02 -1.2512E+04 -7.3507E+02 2.5647E+04THERM0222 1.2000E+01 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.2837E+03 -1.0579E-03 6.2478E+02 -1.2497E+04 -7.3534E+02 2.5671E+04THERM0223 1.4000E+01 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2845E+03 -1.0458E-03 6.2437E+02 -1.2485E+04 -7.3553E+02 2.5594E+04*HERM0224 1.5000E+01 0.0000E+00 2.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2849E+03 -1.0415E-03 6.2419E+02 -1.2486E+04 -7.3562E+02 2.5693E+04THERM0225 $2.0000E + 00 \quad 0.0000E + 00 \quad 3.0000E + 01 \quad 0.0000E + 01 \quad 0.0000E + 00 \quad 0.000E + 00 \quad 0.0000E .0000E+00 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2426E+03 -1.3960E-03 6.5359E+02 -1.3071E+04 -7.3673E+02 2.4853E+04THERM0227 4.0000E+00 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2700E+03 -1.3725E-03 6.3431E+02 -1.2685E+04 -7.4007E+02 2.5403E+04THERM0228 $6.0000E + 00 \quad 0.0000E + 00 \quad 3.0000E + 01 \quad 0.0000E + 01 \quad 0.0000E + 00 \quad 0.000E + 00 \quad 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E +$ 8.0000E+00 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.2953E+03 -1.2905E-03 6.1620E+02 -1.2321E+04 -7.4331E+02 2.5912E+04THERM0230 1.0000E+01 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2980E+03 -1.2720E-03 6.1422E+02 -1.2289E+04 -7.4361E+02 2.5952E+04THERM0231 1.2000E+01 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2996E+03 -1.2610E-03 6.1308E+02 -1.2258E+04 -7.4376E+02 2.5999E+04THERM0232 1.4000E+01 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3005E+03 -1.2543E-03 6.1250E+02 -1.2254E+04 -7.4388E+02 2.6002E+04THERM0233 1.5000E+01 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3010E+03 -1.2519E-03 6.1226E+02 -1.2242E+04 -7.4395E+02 2.6026E+04THERM0234 $3.0000E + 00 \quad 0.0000E + 00 \quad 3.1000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.2578E + 03 \quad -1.3585E - 03 \quad 6.4655E + 02 \quad -1.2931E + 04 \quad -7.4793E + 02 \quad 2.5155E + 04THERMO236 \quad 0.0000E + 00 \quad 0.000E + 00 \quad 0.0000E 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 0.0000E + 00 \quad 0.000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.000$ 4.0000E+00 0.0000E+00 3.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.2853E+03 -1.3771E-03 6.2490E+02 -1.2499E+04 -7.5008E+02 2.5705E+04THERM0237 6.0000E+00 0.0000E+00 3.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3044E+03 -1.3870E-03 6.0963E+02 -1.2189E+04 -7.5154E+02 2.6093E+04THERM0238 8.0000E+00 0.0000E+00 3.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3108E+03 -1.3816E-03 6.0441E+02 -1.2091E+04 -7.5190E+02 2.6211E+04THERM0239 1.0000E+01 0.0000E+00 3.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3137E+03 -1.3764E-03 6.0183E+02 -1.2033E+04 -7.5200E+02 2.6279E+04THERM0240 1.2000E+01 0.0000E+00 3.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3154E+03 -1.3729E-03 6.0027E+02 -1.2009E+04 -7.5205E+02 2.6302E+04THERM0241 $1.4000{\rm E} + 01 \\ 0.0000{\rm E} + 00 \\ 3.1000{\rm E} + 01 \\ 0.0000{\rm E} + 00 \\ 0.0000{\rm E} + 00 \\ 0.0000{\rm E} + 00 \\ 0.0000{\rm E} + 00 \\ 0.0000{\rm E} + 00 \\ 0.13163{\rm E} + 03 \\ -1.3707{\rm E} - 03 \\ 0.9956{\rm E} + 02 \\ -1.1988{\rm E} + 04 \\ -7.5210{\rm E} + 02 \\ 2.6333{\rm E} + 04 \\ -7.5210{\rm E} + 02 \\ 0.0000{\rm E} + 00 \\ 0.0000$ 1.5000E+01 0.0000E+00 3.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3167E+03 -1.3701E-03 5.9938E+02 -1.1992E+04 -7.5214E+02 2.6326E+04THERM0243 $2.0000E + 00 \quad 0.0000E + 00 \quad 3.2000E + 01 \quad 0.0000E + 01 \quad 0.0000E + 00 \quad 0.00$ 3.0000E+00 0.0000E+00 3.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2728E+03 -1.2636E-03 6.3840E+02 -1.2768E+04 -7.5870E+02 2.5456E+04THERM0245 4.0000E+00 0.0000E+00 3.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.3003E+03 -1.2924E-03 6.1456E+02 -1.2289E+04 -7.5976E+02 2.6009E+04THERM0246 6.0000E+00 0.0000E+00 3.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3196E+03 -1.3416E-03 5.9745E+02 -1.1952E+04 -7.6031E+02 2.6387E+04THERM0247 8.0000E+00 0.0000E+00 3.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3259E+03 -1.3626E-03 5.9164E+02 -1.1829E+04 -7.6031E+02 2.6524E+04THERM0248 1.0000E+01 0.0000E+00 3.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3287E+03 -1.3720E-03 5.8901E+02 -1.1783E+04 -7.6023E+02 2.6569E+04THERM0249 $1.2000{\pm}+01 \quad 0.0000{\pm}+00 \quad 3.2000{\pm}+01 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 1.3305{\pm}+03 \quad -1.3772{\pm}-03 \quad 5.8704{\pm}+02 \quad -1.1738{\pm}+04 \quad -7.6018{\pm}+02 \quad 2.6615{\pm}+04\text{THERM0250}$ 1.4000E+01 0.0000E+00 3.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3315E+03 -1.3805E-03 5.8623E+02 -1.1728E+04 -7.6017E+02 2.6625E+04THERM0251 1.5000E+01 0.0000E+00 3.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3319E+03 -1.3818E-03 5.8596E+02 -1.1716E+04 -7.6019E+02 2.6643E+04THERM0252 2.0000E+00 0.0000E+00 3.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2105E+03 -1.2489E-03 7.0483E+02 -1.4094E+04 -7.7083E+02 2.4213E+04THERM0253 3.0000E+00 0.0000E+00 3.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2876E+03 -1.1860E-03 6.2926E+02 -1.2585E+04 -7.6906E+02 2.5753E+04THERM0254 4.0000E+00 0.0000E+00 3.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3151E+03 -1.2014E-03 6.0325E+02 -1.2067E+04 -7.6912E+02 2.6298E+04THERM0255 $6.0000E + 00 \quad 0.0000E + 00 \quad 3.3000E + 01 \quad 0.0000E + 01 \quad 0.0000E + 00 \quad 0.000E + 00 \quad 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0.0000E + 0$ 8.0000E+00 0.0000E+00 3.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.3407E+03 -1.2637E-03 5.7810E+02 -1.1567E+04 -7.6853E+02 2.6806E+04THERM0257 1.0000E+01 0.0000E+00 3.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3436E+03 -1.2770E-03 5.7506E+02 -1.1497E+04 -7.6829E+02 2.6879E+04THERM0258 1.2000E+01 0.0000E+00 3.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3452E+03 -1.2848E-03 5.7344E+02 -1.1473E+04 -7.6814E+02 2.6899E+04THERM0259 1.4000E+01 0.0000E+00 3.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3462E+03 -1.2901E-03 5.7251E+02 -1.1446E+04 -7.6808E+02 2.6930E+04THERM0260 1.5000E+01 0.0000E+00 3.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3466E+03 -1.2922E-03 5.7221E+02 -1.1448E+04 -7.6808E+02 2.6927E+04THERM0261 $2.0000E + 00 \\ 0.0000E + 00 \\ 3.4000E + 01 \\ 0.0000E + 01 \\ 0.0000E + 00 \\ 0.000E + 00 \\ 0.0000E .0000E+00 0.0000E+00 3.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3023E+03 -1.1441E-03 6.1903E+02 -1.2381E+04 -7.7902E+02 2.6046E+04THERM0263 4.0000E+00 0.0000E+00 3.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3296E+03 -1.1478E-03 5.9105E+02 -1.1819E+04 -7.7819E+02 2.6595E+04THERM0264 $6.0000E + 00 \quad 0.0000E + 00 \quad 3.4000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.3489E + 03 \quad -1.1673E - 03 \quad 5.7069E + 02 \quad -1.1417E + 04 \quad -7.7719E + 02 \quad 2.6974E + 04THERMO265 + 0.0000E + 00 \quad 0.0000E$

8.0000E+00 0.0000E+00 3.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3553E+03 -1.1805E-03 5.6368E+02 -1.1270E+04 -7.7656E+02 2.7111E+04THERM0266 1.0000E+01 0.0000E+00 3.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3580E+03 -1.1883E-03 5.6050E+02 -1.1215E+04 -7.7617E+02 2.7153E+04THERM0267 1.2000E+01 0.0000E+00 3.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3597E+03 -1.1933E-03 5.5866E+02 -1.1170E+04 -7.7595E+02 2.7199E+04THERM0268 1.4000E+01 0.0000E+00 3.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3607E+03 -1.1967E-03 5.5764E+02 -1.1156E+04 -7.7584E+02 2.7209E+04THERM0269 1.5000E+01 0.0000E+00 3.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3611E+03 -1.1980E-03 5.5729E+02 -1.1143E+04 -7.7582E+02 2.7227E+04THERM0270 2.0000E+00 0.0000E+00 3.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2418E+03 -1.1677E-03 6.9356E+02 -1.3871E+04 -7.9490E+02 2.4836E+04THERM0271 3.0000E+00 0.0000E+00 3.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3166E+03 -1.1221E-03 6.0786E+02 -1.2157E+04 -7.8859E+02 2.6333E+04THERM0272 4.0000E+00 0.0000E+00 3.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.3436E+03 -1.1202E-03 5.7803E+02 -1.1565E+04 -7.8694E+02 2.6866E+04THERM0273 $6.0000E + 00 \quad 0.0000E + 00 \quad 3.5000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.3628E + 03 \quad -1.1288E - 03 \quad 5.5645E + 02 \quad -1.1125E + 04 \quad -7.8527E + 02 \quad 2.7261E + 04THERMO 274 \\ -7.8527E + 02 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.000E +$ 8.0000E+00 0.0000E+00 3.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3693E+03 -1.1355E-03 5.4863E+02 -1.0977E+04 -7.8439E+02 2.7380E+04THERM0275 1.0000E+01 0.0000E+00 3.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3722E+03 -1.1398E-03 5.4505E+02 -1.0898E+04 -7.8389E+02 2.7449E+04THERM0276 1.2000E+01 0.0000E+00 3.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3738E+03 -1.1423E-03 5.4316E+02 -1.0866E+04 -7.8358E+02 2.7471E+04THERM0277 1.4000E+01 0.0000E+00 3.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3748E+03 -1.1438E-03 5.4203E+02 -1.0838E+04 -7.8342E+02 2.7500E+04THERM0278 1.5000E+01 0.0000E+00 3.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3752E+03 -1.1444E-03 5.4167E+02 -1.0836E+04 -7.8339E+02 2.7500E+04THERM0279 2.0000E+00 0.0000E+00 3.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2574E+03 -1.1526E-03 6.8608E+02 -1.3722E+04 -8.0617E+02 2.5147E+04THERM0280 $3.0000E+00 \quad 0.0000E+00 \quad 3.6000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.3308E+03 \quad -1.1059E-03 \quad 5.9559E+02 \quad -1.1911E+04 \quad -7.9778E+02 \quad 2.6618E+04THERM0281 \quad -2.6618E+04THERM0281 \quad$ 4.0000E+00 0.0000E+00 3.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3575E+03 -1.1007E-03 5.6403E+02 -1.1278E+04 -7.9540E+02 2.7152E+04THERM0282 6.0000E+00 0.0000E+00 3.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3765E+03 -1.1051E-03 5.4108E+02 -1.0824E+04 -7.9314E+02 2.7527E+04THERM0283 8.0000E+00 0.0000E+00 3.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3829E+03 -1.1091E-03 5.3282E+02 -1.0654E+04 -7.9203E+02 2.7661E+04THERM0284 1.2000E+01 0.0000E+00 3.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3873E+03 -1.1130E-03 5.2703E+02 -1.0539E+04 -7.9104E+02 2.7748E+04THERM0286 1.4000E+01 0.0000E+00 3.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3882E+03 -1.1140E-03 5.2589E+02 -1.0520E+04 -7.9084E+02 2.7761E+04THERM0287 1.5000E+01 0.0000E+00 3.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3887E+03 -1.1144E-03 5.2544E+02 -1.0507E+04 -7.9080E+02 2.7776E+04THERM0288 2.0000E+00 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2727E+03 -1.1400E-03 6.7759E+02 -1.3551E+04 -8.1694E+02 2.5455E+04THERM0289 3.0000E+00 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3444E+03 -1.0891E-03 5.8259E+02 -1.1651E+04 -8.0660E+02 2.6890E+04THERM0290 4.0000E+00 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3709E+03 -1.0816E-03 5.4919E+02 -1.0985E+04 -8.0356E+02 2.7417E+04THERM0291 6.0000E+00 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3897E+03 -1.0834E-03 5.2509E+02 -1.0499E+04 -8.0078E+02 2.7796E+04THERM0292 8.0000E+00 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3959E+03 -1.0863E-03 5.1656E+02 -1.0334E+04 -7.9946E+02 2.7916E+04THERM0293 1.0000E+01 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3990E+03 -1.0883E-03 5.1224E+02 -1.0242E+04 -7.9874E+02 2.7984E+04THERM0294 1.2000E+01 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.4006E+03 -1.0894E-03 5.0990E+02 -1.0200E+04 -7.9832E+02 2.8009E+04THERM0295 1.4000E+01 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4016E+03 -1.0901E-03 5.0866E+02 -1.0171E+04 -7.9809E+02 2.8035E+04THERM0296 1.5000E+01 0.0000E+00 3.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4020E+03 -1.0903E-03 5.0822E+02 -1.0167E+04 -7.9804E+02 2.8038E+04THERM0297 2.0000E+00 0.0000E+00 3.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2879E+03 -1.1261E-03 6.6795E+02 -1.3359E+04 -8.2724E+02 2.5758E+04THERM0298 3.0000E+00 0.0000E+00 3.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3579E+03 -1.0700E-03 5.6851E+02 -1.1370E+04 -8.1506E+02 2.7158E+04THERM0299 $4.0000E + 00 \quad 0.0000E + 00 \quad 3.8000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.3839E + 03 \quad -1.0605E - 03 \quad 5.3360E + 02 \quad -1.0670E + 04 \quad -8.1144E + 02 \quad 2.7681E + 04THERMO300E + 00 \quad 0.0000E 00 \quad 0.0000E + 00 \quad 0.$ 6.0000E+00 0.0000E+00 3.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4025E+03 -1.0605E-03 5.0828E+02 -1.0170E+04 -8.0820E+02 2.8044E+04THERM0301 8.0000E+00 0.0000E+00 3.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4088E+03 -1.0626E-03 4.9923E+02 -9.9820E+03 -8.0670E+02 2.8180E+04THERM0302 1.0000E+01 0.0000E+00 3.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4116E+03 -1.0639E-03 4.9505E+02 -9.9035E+03 -8.0589E+02 2.8229E+04THERM0303 $1.2000E+01 \quad 0.0000E+00 \quad 3.8000E+01 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 0.0000E+00 \quad 1.4134E+03 \quad -1.0648E-03 \quad 4.9234E+02 \quad -9.8450E+03 \quad -8.0543E+02 \quad 2.8269E+04THERM0304E+00 \quad 0.0000E+00 \quad$ 1.4000E+01 0.0000E+00 3.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4142E+03 -1.0654E-03 4.9111E+02 -9.8259E+03 -8.0517E+02 2.8280E+04THERM0305 1.5000E+01 0.0000E+00 3.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4148E+03 -1.0657E-03 4.9057E+02 -9.8097E+03 -8.0510E+02 2.8297E+04THERM0306 2.0000E+00 0.0000E+00 3.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3030E+03 -1.1099E-03 6.5707E+02 -1.3137E+04 -8.3708E+02 2.6066E+04THERM0307 3.0000E+00 0.0000E+00 3.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3707E+03 -1.0488E-03 5.5376E+02 -1.1073E+04 -8.2318E+02 2.7417E+04THERM0308 4.0000E+00 0.0000E+00 3.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3965E+03 -1.0366E-03 5.1724E+02 -1.0347E+04 -8.1905E+02 2.7928E+04THERM0309 $6.0000E + 00 \quad 0.0000E + 00 \quad 3.9000E + 01 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 0.0000E + 00 \quad 1.4149E + 03 \quad -1.0349E - 03 \quad 4.9074E + 02 \quad -9.8122E + 03 \quad -8.1541E + 02 \quad 2.8302E + 04THERM03100E + 00.000E .0000E+00 0.0000E+00 3.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4212E+03 -1.0362E-03 4.8131E+02 -9.6280E+03 -8.1375E+02 2.8421E+04THERM0311 1.0000E+01 0.0000E+00 3.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4239E+03 -1.0376E-03 4.7692E+02 -9.5370E+03 -8.1286E+02 2.8480E+04THERM0312 1.2000E+01 0.0000E+00 3.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4254E+03 -1.0383E-03 4.7457E+02 -9.4935E+03 -8.1233E+02 2.8505E+04THERM0313 1.4000E+01 0.0000E+00 3.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4264E+03 -1.0387E-03 4.7309E+02 -9.4606E+03 -8.1204E+02 2.8530E+04THERM0314 1.5000E+01 0.0000E+00 3.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4269E+03 -1.0389E-03 4.7257E+02 -9.4528E+03 -8.1197E+02 2.8536E+04THERM0315 2.0000E+00 0.0000E+00 4.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.3174E+03 -1.0915E-03 6.4555E+02 -1.2911E+04 -8.4647E+02 2.6348E+04THERM0316 3.0000E+00 0.0000E+00 4.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.3835E+03 -1.0256E-03 5.3791E+02 -1.0758E+04 -8.3098E+02 2.7670E+04THERM0317 $4.0000E+00 \\ 0.0000E+00 \\ 4.0000E+01 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 1.4087E+03 \\ -1.0112E-03 \\ 5.0013E+02 \\ -9.9998E+03 \\ -8.2638E+02 \\ 2.8176E+04THERM0318 \\ 0.0000E+00 \\ 0.00$ 6.0000E+00 0.0000E+00 4.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4268E+03 -1.0075E-03 4.7258E+02 -9.4539E+03 -8.2240E+02 2.8534E+04THERM0319 8.0000E+00 0.0000E+00 4.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.4330E+03 -1.0083E-03 4.6277E+02 -9.2541E+03 -8.2060E+02 2.8661E+04THERM0320 1.0000E+01 0.0000E+00 4.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4356E+03 -1.0089E-03 4.5830E+02 -9.1686E+03 -8.1963E+02 2.8709E+04THERM0321 1.2000E+01 0.0000E+00 4.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.4372E+03 -1.0095E-03 4.5575E+02 -9.1142E+03 -8.1907E+02 2.8745E+04THERM0322 1.4000E+01 0.0000E+00 4.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4381E+03 -1.0100E-03 4.5425E+02 -9.0873E+03 -8.1877E+02 2.8760E+04THERM0323 1.5000E+01 0.0000E+00 4.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4386E+03 -1.0102E-03 4.5368E+02 -9.0725E+03 -8.1869E+02 2.8774E+04THERM0324

Listing 4.3 ZONAIR Solution File: THERMi

```
(Only SHOWS the file: THERM0001)
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                                                                                                      1 HVWCP
                                                                                                                                   1P 5E16 9
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  3.823106885E-01 3.627509475E-01 3.413421512E-01 3.189724684E-01 2.948293686E-01 2.806720734E-01 2.003856301E-01 1.782751083E-02 8.712649345E-03 1.259056330E-01
   2.839162350E-01 2.865498066E-01 3.102762699E-01 3.413421512E-01 3.665290475E-01
  3.864405751E-01 3.993574381E-01 4.132434130E-01 4.284523726E-01 4.455744028E-01 4.656879306E-01 4.910055399E-01 5.279328823E-01 6.171896458E-01 4.585480690E-01
  4.455744028E-01 4.284523726E-01 4.181436896E-01 4.038643241E-01 3.906537890E-01 3.782590032E-01 3.665290475E-01 3.590351343E-01 3.413421512E-01 3.219955564E-01
  2.971912622E-01 2.811959386E-01 2.238786221E-02 4.235446453E-03 4.585480690E-01 4.455744028E-01 4.284523726E-01 4.181436896E-01 4.038643241E-01 3.906537890E-01 3.782590032E-01 3.665290475E-01 3.590351343E-01 3.413421512E-01 3.219955564E-01
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  2.647452950E-01 2.538042665E-01 2.443374693E-01 2.358411849E-01 2.280283868E-01 2.207271755E-01 2.094340175E-01 1.970738024E-01 1.841595173E-01 1.702201366E-01
1.620455533E-01 2.351514697E-01 9.430852532E-02-7.450746000E-02-2.146733254E-01-1.639190614E-01-1.654389352E-01-1.791380048E-01-1.970738024E-01-2.116155773E-01-2.231115401E-01-2.305688262E-01-2.385865003E-01-2.473666668E-01-2.572523654E-01-2.688661814E-01-2.834716737E-01-3.047956228E-01-3.563324213E-01-2.647452950E-01
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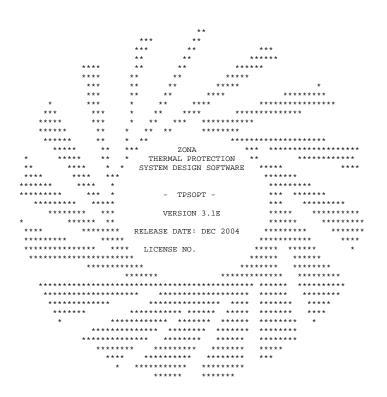
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-2.572523654 \pm -01 - 2.473666668 \pm -01 - 2.414155006 \pm -01 - 2.331710905 \pm -01 - 2.255440950 \pm -01 - 2.183878124 \pm -01 - 2.116155773 \pm -01 - 2.072888911 \pm -01 - 1.970738024 \pm -01 1.859041899 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.07288911 \pm -01 - 2.
  1.715839207E-01 1.623488069E-01 1.043592542E-01 4.625983909E-02
                                                                       64
   1.700157046E+00 1.707506537E+00 6.652494073E-01 8.149340749E-01 8.996474147E-01
  9.607827067E-01 1.009701967E+00 1.051200986E+00 1.087720633E+00 1.120633721E+00 1.150778770E+00 1.196199059E+00 1.244264126E+00 1.292564631E+00 1.341477394E+00
  1.363949180E+00 1.420445085E+00 1.685338855E+00 1.696901679E+00 1.526892900E+00 1.349177718E+00 1.356628299E+00 1.310680509E+00 1.244264126E+00 1.187540054E+00
  1.141001344E+00 1.110002995E+00 1.076003313E+00 1.038015962E+00 9.943884015E-01 9.421096444E-01 8.749709725E-01 7.766770720E-01 5.660333037E-01 9.607827067E-01 9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00
  1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00 1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00 9.607827067E-01
  9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00 1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00
   1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00
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   6.789267063E-03 4.805326462E-04 5.717942715E-01 5.135470629E-01 4.817758203E-01
  4.585480690E-01 4.396029711E-01 4.232070446E-01 4.084888697E-01 3.949568868E-01 3.823106885E-01 3.627509475E-01 3.413421512E-01 3.189724684E-01 2.948293686E-01
  2.806720734E-01 2.003856301E-01 1.782751083E-02 8.712649345E-03 1.259056330E-01 2.839162350E-01 2.865498066E-01 3.102762699E-01 3.413421512E-01 3.665290475E-01
  3.864405751 \\ \text{E}-01 \ \ 3.993574381 \\ \text{E}-01 \ \ 4.132434130 \\ \text{E}-01 \ \ 4.284523726 \\ \text{E}-01 \ \ 4.455744028 \\ \text{E}-01 \ \ 4.28452372 \\ \text{E}-01 \ \ 4.455744028 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ \text{E}-01 \ \ 4.45574402 \\ 
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  3.782590032E-01 \ \ 3.665290475E-01 \ \ 3.590351343E-01 \ \ 3.413421512E-01 \ \ 3.219955564E-01 \ \ 2.971912622E-01 \ \ 2.811959386E-01 \ \ 2.238786221E-02 \ \ 4.235446453E-03 \ \ 4.585480690E-01 \ \ 
  4.455744028E-01 4.284523726E-01 4.181436896E-01 4.038643241E-01 3.906537890E-01 3.782590032E-01 3.665290475E-01 3.590351343E-01 3.413421512E-01 3.219955564E-01
  2.971912622E-01 2.811959386E-01 2.238786221E-02 4.235446453E-03
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  1.715839207E-01 1.623488069E-01 1.043592542E-01 4.625983909E-02
                                                                        64
  1.700157046E+00 1.707506537E+00 6.652494073E-01 8.149340749E-01 8.996474147E-01
  9.607827067E-01 1.009701967E+00 1.051200986E+00 1.087720633E+00 1.120633721E+00 1.150778770E+00 1.196199059E+00 1.244264126E+00 1.292564631E+00 1.341477394E+00
   1.363949180E+00 1.420445085E+00 1.685338855E+00 1.696901679E+00 1.526892900E+00
  1.349177718E+00 1.356628299E+00 1.310680509E+00 1.244264126E+00 1.187540054E+00
    1.141001344E+00 1.110002995E+00 1.076003313E+00 1.038015962E+00 9.943884015E-01
  9.421096444E-01 8.749709725E-01 7.766770720E-01 5.660333037E-01 9.607827067E-01 9.943884015E-01 1.038015962E+00 1.063846469E+00 1.099042654E+00 1.130959034E+00
   1.160308242E+00 1.187540054E+00 1.204663634E+00 1.244264126E+00 1.286167979E+00
   1.336923599E+00 1.364203334E+00 1.679828525E+00 1.703988910E+00 9.607827067E-01
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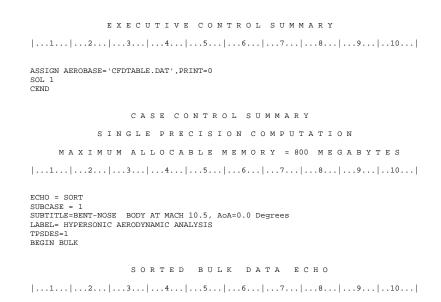
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• Output Data Listing

CARD

Listing 4.4 Standard Output File: WEDGE_TPS.OUT





1		DESVAR		6	1						CONT
2		CONT DESVAR		15 3	16 1	17	18	19			CONT
4					13						CONT
5		DESVAR			1						CONT
6	-	CONT	20	26	32						
7		PANLST2				15	16			19	
8		PANLST2				15	16	17	18	19	
9 10		PANLST2 PANLST2				THRU 6	13 13				
11		PANLST2				THRU	32				
12		PANLST2				26	32				
13	-	PARAM	STREAM	1.E-6							
14				11	12						
15				21	22						
16 17		PATCH PLTAERO		31 YES	32 NO		MASTRAM	AEROMESI	I NAC		
18		PLTTPS				TECPLOT	WEDGETE				
19		PLTTPS				TECPLOT	WEDGETE	STM.PLT	0.05		
20			4		30000000)					
21 22		PODRSM CONT		1	HOODDOM	חמת	VPODRSM	SAVE	WEDGE30 WPODRSM		CONT
23		STTYPE	CPPODRSM 1		508	PSD	VPODRSM	. ₽ 3 D	WPODRSM	. ₽3D	CONT
24		CONT	0.01	-	500						CONT
25		STTYPE		1	501						CONT
26		CONT	1.0								
27		STTYPE		6	245						CONT
28 29		CONT STTYPE	0.01	1	313						CONT
30			0.05	-							00141
31	-	STTYPE		6	245						CONT
32		CONT	0.01	_							
33		STTYPE		1	103						CONT
34 35		CONT STTYPE	0.1	6	221						CONT
36		CONT	0.02	0	221						CONT
37				1	266						CONT
38		CONT	0.02								
39		STTYPE		1	260						CONT
40 41		CONT STTYPE	1.	1	266						CONT
42		CONT	0.15	-	200						00111
43		STTYPE	35	6	245						CONT
44		CONT	0.2	_							
45		STTYPE		1	103						CONT
46 47		CONT THERMPR	0.1	100F							
48		TPSDES		1	1	1					CONT
49	-	CONT	1	2	3						
50		TPSSYM	1			4					CONT
51 52			1	1	0.008						CONT
53			1	3	0.5	0.1					CONT
54			1	4	0.015	0.2					CONT
55					0.01	0.1					CONT
56		CONT				0.2					
57 58		TPSSYM CONT				4 0.1					CONT
59					0.005	0.1					CONT
60						5.0					CONT
61		CONT		34	0.02	1.0					CONT
62		CONT		35	0.01	0.8					CONT
63 64		CONT		36		1.0					CONT
65		TPSSYM		3 1	6 0.008	-					CONT
66		CONT	3	2	0.5	4.0					CONT
67		CONT	3	3	0.01	0.1					CONT
68		CONT	3	4	0.015	0.2					CONT
69 70		CONT	3	5 6	0.01	0.1					CONT
71		TRAJCT		1	02						CONT
72		CONT	.00000E0	0.71871	.45600E6						CONT
73		CONT	.16000E2	0.98944	.41990E6	514.0000					CONT
74		CONT			.43688E6						CONT
75 76		CONT			.58196E6						CONT
77		CONT			.11358E7						CONT
78		CONT			.14897E7						CONT
79		CONT			.18668E7						CONT
80		CONT			.22489E7						CONT
81 82		CONT			.26307E7						CONT
83		CONT			.31108E7						CONT
84	-	CONT	.22500E3	8.80061	.31479E7	710.2250					CONT
85		CONT			.30495E7						CONT
86		CONT			.28476E7						CONT
87 88		CONT			.25083E7						CONT
89		CONT			.17006E7						CONT
90		CONT			.15705E7						CONT
91		CONT			.15555E7						CONT
92 93		CONT			.15505E7						CONT
ر ر		CO141		J.JUZ#0	. 101006	0002					COIVI

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94 -
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                                                 .55900E34.78106 .13103E78.7931
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                         102 -
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.79600E31.47000 .66074E63.0928
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                                                                                                                            CONT
                         113 -
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                                       CONT
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                                                                    .59940E63.3054
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                                       CONT
                                                 .85600E30.86983 .48792E63.8046
                                                                                                                            CONT
                         117 -
                                       CONT
                                                 .87400E30.80178 .43914E63.9110
                                                                                                                            CONT
                                                 .89400E30.73186 .38870E63.9359
                         118 -
                                       CONT
                                                                                                                            CONT
                         119 -
                                       CONT
                                                 .91400E30.67432
                                                                    .34157E63.9549
                                                                                                                            CONT
                                                 .93400E30.62713 .29712E63.9492
                         120 -
                                       CONT
                                                                                                                            CONT
                                       CONT
                                                 .95400E30.58784 .25488E63.9046
                                                                                                                            CONT
                                                 .97400E30.55190 .21464E63.8498 .99400E30.51899 .17633E63.8233
                         122 -
                                       CONT
                                                                                                                            CONT
                                       CONT
                         123 -
                                                                                                                            CONT
                                       CONT
                                                 .10140E40.48941 .13984E63.8101 .10340E40.46307 .10502E63.8009
                         124 -
                                                                                                                            CONT
                         125 -
                                                                                                                            CONT
                         126 -
                                       CONT
                                                 .10540E40.43975 .71741E53.7895
                                                                                                                            CONT
                         127 -
                                       CONT
                                                 .10740E40.41915 .39891E53.7718
                                                                                                                            CONT
                                       CONT
                                                 .10940E40.40098 .93915E43.7458
                                       TRITIST
                                                                                                                            CONT
                         129 -
                                       CONT
                         130 -
                         131 -
                                       ENDDATA
                                                        SUBCASE
                                                        DISCIPLINE = TPSDES
                                                        BULK ENTRY ID =
                       OPTIMIZATION SYSTEM FOR TPSSYM = 1
TOTAL NUMBER OF DESIGN VARIABLES =
                                           3.0
TOTAL NUMBER OF CONSTRAINS
                                           792
TOTAL NUMBER OF TEMP. CONSTRAINS =
TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
        0.2223E+04
                                  В
                                                      R
                                                              R
                                                                   R
                                                                                 Α
                                                                                                            В
                                                                                                            A
F
                                                                                                                         D
                                                                                                                                 D
                                                                                                                                             В
                      .15
                                    . 25
                                                  .35
                                                                                                          .75
                                                                                                                        .85
                                                                                                                                       .95
                                                                                                                                                  1.05
                                                                              .55
                                                                       TIME ( X 2.803E-44 )
                 MAXIMUM TEMPERATURE OF EVERY LAYER
                               3
550.33
                                         4
450.33
                                                    550.33
         2300.33 2400.33
                                                               350.33
                                                    349.96
                  2219.04
                              449.45
                                         449.45
                                                               349.96
                       VALUES OF DESIGN VARIABLES :
```

1.0 B

-1.0 .05

LAYER:

Optv:

2223.00

```
LAYER
       DEV01
               DEV02
                       DEV03
                               DEV04
                                       DEV05
                                               DEV06
     0.00800 0.00808 0.00800 0.00902 0.00809
   2 0.56594 0.82798
                     1.06020
                             1.23897
                                     1.07278
                                             0.94884
     0.01000 0.01010 0.01000 0.01127 0.01345 0.01013
     0.01500
              0.11378
                      0.12437
                              0.19531
                                      0.12512
                                              0.12317
     0.01000 0.01010 0.01000
                             0.01127 0.01361
                                             0.01013
THE ORIGINAL OBJECTIVE FUNCTION =
                                   6.0350003
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.9909588
THE TOTAL OPTIMAL WEIGHT = 3.75722822E+03
            OPTIMAL STRUCTURES OF TPS FOR PATCH = 1
                   (WITH AVERAGE THICKNESS)
RCG COATING
                                                        0.00821 in. 2223.0 F
                                      slab
 ______
                    LI900
                                       slab
                                                         0.95245 in. 2219.0 F
                                                         0.01082 in. 449.4 F
                    RTV-560
                                      thin skin
                                                         0.11612 in. 449.4 F
                    5.4 LB SIP
                                                         i
-----
_____
                                                         0.01085 in. 350.0 F
                  RTV-560
                               thin skin
-----
                                                         ----
                   ALUMINUM 7075-T6 slab
                                                         0.10000 in. 350.0 F
_____
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
         LAYER01
                           LAYER02
                                             LAYER03
                                                               LAYER04
                                                                                 LAYER05
                                                                                                   LAYER06
                  1250.59
                                    1250.09
                                                       550.33
                                                                         352.40
         0.00800
                           0.56594
                                             0.01000
                                                               0.01500
                                                                                 0.01000
                                                                                                   0.10000
                                                                                                             349.96
     15
         0.00808
                  1709.70
2031.55
                           0.82798
                                    1708.53
2030.66
                                             0.01010
                                                       550.33
550.33
                                                               0.11378
                                                                         447.56
447.03
                                                                                 0.01010
                                                                                           397.52
396.73
                                                                                                   0.10000
                                                                                                             347.48
346.42
                           1.06020
                                             0.01000
                                                                                                   0.10000
         0.00800
                                                               0.12437
                                                                                 0.01000
     16
         0.00902
                  2161.90
                          1.23897
                                    2159.80 0.01127
                                                       550.33
                                                               0.19531
                                                                         447.91
                                                                                 0.01127
                                                                                           366.64
                                                                                                   0.10000
                                                                                                             285.37
         0.00809
                  2223.00
                                    2221.02
                                             0.01345
                                                       550.33
                                                               0.12512
                                                                         449.20
                                                                                           397.55
                                                                                                   0.10000
                                                                                                             345.89
     18
                                                                                 0.01361
                                  2120.86
         0.00810 2122.85
                          0.94884
                                            0.01013
                                                       550.33
                                                               0.12317
                                                                                           398.03
                 OPTIMIZATION SYSTEM FOR TPSSYM = 2
TOTAL NUMBER OF DESIGN VARIABLES = 15
TOTAL NUMBER OF CONSTRAINS = 496
TOTAL NUMBER OF TEMP. CONSTRAINS = 396
TOTAL NUMBER OF TEMP. PRINTOUTS = 22
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
      0.1211E+04
  1.0 C
          C
                          C
                               C
                                    C
                                         C
                                               C
                                                         C
                                                              C
                                                                    C
                                              F
                                                              D
                                                                                                       C
  0.0
               .15 .25 .35 .45 .55 .65 TIME ( X 2.803E-44 )
      .05
                                                                                .75
                                                                                          .85
                                                                                                     .95
                                                                                                               1 05
            MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4 5
Tmax: 2300.33 2020.33 1800.33 2020.33 550.33
Optv: 1211.14 1211.14 1206.49 354.15 350.15
                                               350.15
                VALUES OF DESIGN VARIABLES :
   ER DEV01 DEV02 DEV03
1 0.00500 0.00505 0.00500
2 0.00500 0.00505 0.00500
LAYER
```

```
3 0.33529 0.40782 0.53436
   4 0.02000 0.02020 0.02000
   5 0.01000 0.01010 0.01000
THE ORIGINAL OBJECTIVE FUNCTION = 36.4379196
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.1323187
THE TOTAL OPTIMAL WEIGHT = 1.87973729E+04
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                   (WITH AVERAGE THICKNESS)
HRSI COAT thin skin
                                                          0.00502 in. 1211.1 F
-----
                                                         ----
                    AB312 Fabric
                                      slab
                                                          0.00502 in. 1211.1 F
                                                           i
 _____
                    Q-Felt(3.5 PCF)
                                                          0.42582 in. 1206.5 F
                                                          0.02007 in. 354.2 F
                    AB312 Fabric
                                       slab
_____
                                                          0.01003 in. 350.2 F
                                                         ----
_____
                   ALUMINUM 7075-T6 slab
                                                          0.10000 in. 350.2 F
                                                           i
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL LAYER01
                           LAYER02
                                             LAYERO3
                                                                LAYER04
                                                                                  LAYER05
                                                                                                    LAYER06
                   960.98 0.00500
                                     960.98
                                                       957.01
                                                                          653.60
                                                                                            352.15
         0.00500
                                              0.33529
                                                                0.02000
                                                                                  0.01000
                                                                                                    0.10000
                                                                                                              350.15
         0.00502
                  1004.09 0.00502
                                    1004.09
                                             0.34808
                                                      1000.13
                                                                0.02007
                                                                          674.83
                                                                                  0.01004
                                                                                            351.46
                                                                                                    0.10000
                                                                                                              349.43
         0.00503
                  1042.23
                           0.00503
                                    1042.23
                                             0.36206
                                                       1038.31
                                                                0.02013
                                                                          693.68
                                                                                  0.01006
                                                                                            350.92
                                                                                                    0.10000
                                                                                                              348.87
                  1126.85
                           0.00504
                                    1126.85
                                              0.37691
                                                       1119.58
                                                                          352.16
         0.00504
                                                                0.02017
                                                                                  0.01008
                                                                                            348.11
                                                                                                    0.10000
                                                                                                              348.11
         0.00505
                  1103.40
1126.85
                           0.00505
0.00505
                                    1103.40
1126.85
                                             0.39229
0.40782
                                                       1099.65
                                                                0.02019
                                                                          724.10
735.87
                                                                                  0.01010
                                                                                            350.27
                                                                                                    0.10000
                                                                                                              348.23
         0.00505
                                                       1123.21
                                                                                  0.01010
                                                                                            350.13
                                                                                                    0.10000
                                                                                                              348.11
         0.00505
                  1146.08
                           0.00505
                                     1146.08
                                              0.42318
                                                       1142.57
                                                                0.02020
                                                                          745.58
                                                                                  0.01010
                                                                                            350.10
                                                                                                    0.10000
                                                                                                              348.11
         0.00505
                  1161.60
                                     1161.60
                                              0.43808
                                                       1158.22
                                                                0.02019
                                                                          753.49
                                                                                            350.14
                                                                                                    0.10000
                                                                                  0.01010
                                                                                                              348.15
         0.00504
                  1173.93
                           0.00504
                                     1173.93
                                              0.45227
                                                       1170.70
                                                                0.02018
                                                                          759.83
                                                                                  0.01009
                                                                                            350.24
                                                                                                    0.10000
     10
         0.00504
                  1187 28
                           0.00504
                                    1187 28
                                             0 47131
                                                       1184 24
                                                                0.02015
                                                                          766 78
                                                                                  0.01007
                                                                                            350.45
                                                                                                    0 10000
                                                                                                              348 53
         0.00503
                  1211.14
                           0.00503
                                    1211.14
                                              0.49382
                                                       1206.49
                                                                0.02011
                                                                          353.40
                                                                                  0.01005
                                                                                            349.89
                                                                                                    0.10000
                                                                                                              349.89
     12
         0.00501
                  1206.74
                           0.00501
                                    1206.74
                                              0.51532
                                                       1204 19
                                                                0.02005
                                                                          777.33
                                                                                  0.01003
                                                                                            351.22
                                                                                                    0.10000
                                                                                                              349 41
         0.00500
                  1211.14
                           0.00500
                                    1211.14
                                            0.53436
                                                               0.02000
                                                                          779.95
                                                                                  0.01000
                                                                                            351.65
                                                                                                    0.10000
                                                      1208.81
                                                                                                              349.89
                 OPTIMIZATION SYSTEM FOR TPSSYM =
TOTAL NUMBER OF DESIGN VARIABLES = 15
TOTAL NUMBER OF CONSTRAINS = 496
TOTAL NUMBER OF TEMP. CONSTRAINS = 396
TOTAL NUMBER OF TEMP. PRINTOUTS = 22
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.2103E+04
  1.0 B
           В
                R
                     В
                           В
                                                          Α
                                                          D
                                                               D
           F F
                                   F
                                                    D
                                                                    D
                                                                         D
  0.0
 -1.0 -
                                                      .55 .65
TIME ( X 2.803E-44 )
      .05
                .15
                          .25 .35
                                                 .45
                                                                                 .75 .85 .95
                                                                                                                1.05
             MAXIMUM TEMPERATURE OF EVERY LAYER
     1 2 3 4 5 6
2300.33 2400.33 550.33 450.33 550.33 350.33
2103.05 2099.08 447.63 447.63 349.73 349.74
LAYER:
Tmax:
Optv:
```

```
DEV01
              DEV02
                      DEV03
  1 0.00808 0.00800 0.00808
             0.67940
    0.81594
                     0.58516
    0.01010
             0.01000
                     0.01010
    0.11833
             0.01500
                     0.01515
     0.01010
             0.01000 0.01010
THE ORIGINAL OBJECTIVE FUNCTION =
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.7439033
THE TOTAL OPTIMAL WEIGHT = 2.35277212E+04
            OPTIMAL STRUCTURES OF TPS FOR PATCH =
                  (WITH AVERAGE THICKNESS)
______
                   RCG COATING
                                                        0.00806 in. 2103.0 F
                                                        0.69350 in. 2099.1 F
_____
                   RTV-560
                                                        0.01007 in. 447.6 F
_____
                   5.4 LB SIP
                                      slab
                                                        0.04950 in. 447.6 F
                                                         i
-----
-----
                                                        0.01007 in. 349.7 F
                   RTV-560
                                     thin skin
                   ALUMINUM 7075-T6
                                                        0.10000 in. 349.7 F
       THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
 PANEL
        LAYER01
                          LAYER02
                                             LAYER03
                                                               LAYER04
                                                                                 LAYER05
                                                                                                   LAYER06
    20
        0.00808
                 2103.05
                          0.81594
0.79626
                                   2101.06
                                            0.01010
0.01008
                                                      550.33
550.33
                                                              0.11833
0.09998
                                                                        447.63
                                                                                 0.01010
0.01008
                                                                                           397.57
                                                                                                   0.10000
0.10000
                                                                                                             347.51
                 2102.04
                                    2100.01
                                                                         430.51
                                                                                           389.25
                                                                                                             347.99
    21
    22
        0.00804
                 2100.49
                          0.76470
                                    2098.41
                                             0.01005
                                                       550.33
                                                               0.07250
                                                                         404.86
                                                                                 0.01005
                                                                                           376.76
                                                                                                   0.10000
                                                                                                             348.67
    23
        0.00802
                 2099.09
                                    2096.96
                                             0.01002
                                                       550.33
                                                              0.04845
                                                                         382.37
                                                                                           365.78
                                                                                                   0.10000
                                                                                                             349.20
                                                                                 0.01002
    24
        0.00801
                  2098.18
                          0.71215
                                    2096.01
                                             0.01001
                                                       550.33
                                                               0.03349
                                                                         368.33
                                                                                 0.01001
                                                                                           358.91
                                                                                                   0.10000
                                                                                                             349.49
    25
        0.0800
                 2097.56
                          0 69610
                                    2095 37
                                             0.01000
                                                       550 33
                                                              0 02375
                                                                         359 17
                                                                                 0.01000
                                                                                           354 40
                                                                                                   0 10000
                                                                                                             349 64
                  2096.97
    26
        0.00800
                          0.67940
                                    2094.75
                                             0.01000
                                                       550.33
                                                               0.01500
                                                                         350.91
                                                                                 0.01000
                                                                                           350.32
                                                                                                   0.10000
                                                                                                             349.74
                                            0.01000
0.01001
    27
        0.00800
                 2096.43
                          0.66235
                                    2094.19
                                                       550.33
                                                              0.00800
                                                                        348.83
                                                                                 0.01000
                                                                                           349.75
                                                                                                   0.10000
                                                                                                             349 74
    28
        0.00801
                  2095.98
                          0.64530
                                    2093.72
                                                       550.33
                                                              0.00800
                                                                         348.83
                                                                                 0.01001
                                                                                           349.67
                                                                                                   0.10000
                                                                                                             349.67
    29
        0.00802
                  2095.64
                          0.62867
                                    2093.37
                                             0.01002
                                                       550.33
                                                              0.00800
                                                                         348 83
                                                                                 0.01002
                                                                                           349.46
                                                                                                   0.10000
                                                                                                             349 46
    30
        0.00803
                 2095.44
                                    2093.16
                                             0.01004
                                                              0.00800
                                                                         348.83
                                                                                 0.01004
                                                                                           349.12
                                                                                                   0.10000
                          0.61284
                                                       550.33
                                                                                                             349.12
    31
         0.00805
                  2095.41
                          0.59823
                                    2093.12
                                             0.01007
                                                       550.33
                                                               0.00800
                                                                         348.83
                                                                                 0.01007
                                                                                           348.63
                                                                                                   0.10000
    32
        0.00808
                 2095.55
                          0.58516
                                   2093.27
                                            0.01010
                                                       550.33
                                                              0.01515
                                                                        349.68
                                                                                 0.01010
                                                                                           348.83
                                                                                                  0.10000
                                                                                                             347.99
                                       ********
                                       *** T P S O P T T E R M I N A T E D ***
                                               NORMALLY
                                       ***
                                                                        ***
                                       ***
                                                                         ***
                                             12:10:37 09/04/2005
                                       ***
```

VALUES OF DESIGN VARIABLES :

5.0 Micro-X Vehicle

- Purpose: To demonstrate the applicability of the TPSOPT software system for the Micro-

X configuration.

- *Input File*: - Standard input File: MICRO_X_TPS.INP (Listing 5.1)

- Aerodynamic Database: CFDTABLE.DAT (Listing 5.2)

- Geometry File: MICROXGEO.DAT (Binary file)

- ZONAIR Solution File: FLOWi (Listing 5.3)

- Output File: - Standard Output File: MICRO_X_TPS.OUT (Listing 5.4)

- Vehicle Surface Mesh: MICRO_X_GEO.PLT (Figure 5.1)

- Response surfaces for POD analysis (Figure 5.4)

- C_p Plot File: CPTEMP.PLT (Figure 5.5)

- Temperature Plot File: CPTEMP.PLT (Figure 5.6)

- Thickness Distribution Plot File: MICRO_X_HT.PLT (Figure 5.7)

5.1 The Surface Mesh of the Micro-X Vehicle

The ZONAIR model for the Micro-X configuration consists of the body, two wings and one vertical wing. The surface panels shown in Figure 5.1 are generated by ZONAIR and outputted as a binary file "MICROXGEO.DAT". This file is invoked by specifying the name on the second row of the aerodynamic database (CFDTABLE.DAT) that is imported by the "ASSIGN AEROBASE=" executive control command.

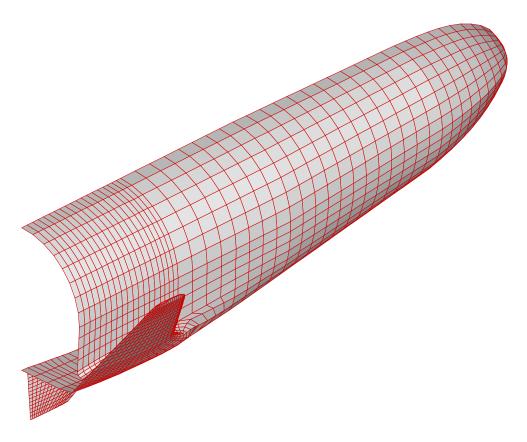


Figure 5.1. Surface mesh for Micro-X vehicle

5.2 The Aerodynamic Database: CFDTABLE.DAT

The aerodynamic database is generated by running ZONAIR for 80 combinations of 20 Mach numbers (2, 5, 8, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27) and 4 angles of attack (0, 10, 20, 30). This file provides TPSOPT system with all flowfield information from ZONAIR. The first row is a title card (Micro-x model consists of body, wing and vertical wing); the second row provide the geometry file name (MICROXGEO.DAT); the third and fourth rows list the name of the reference chord, span, ...etc, and their values, respectively; the fifth row lists the names of items in the following rows (Mach number, Altitude, Angle of attack, etc.) and the remaining rows contain the values of the items listed in the fifth row and the file names of flowfield (FLOW0001 to FLOW0080) in the last column which stored the velocity and pressure coefficients for the combination of the Mach number and Angle of attack listed in the corresponding row.

5.3 The Standard Input File (MICRO_X_TPS.INP)

The standard input file consists of two major parts: the flow field information and the TPS optimization system. The flow field information is provided by ZONAIR and imported by the aerodynamic database (CFDTABLE.DAT) using the following statement on the first row in the Input File:

ASSIGN AEROBASE='CFDTABLE.DAT'

The TPS optimization system is the major portion of the standard input file, which includes the definition of optimization patches for TPS and specification of trajectory data. Twenty nine optimization patches are defined over the TPS located on the whole vehicle surface (Figure 5.2), among which patch 1 is located around nose of the vehicle, 10 and 29 on the leading edge of the wing and 30 over the vertical wing. Figure 5.3 shows individual patches and panel numbers over them.

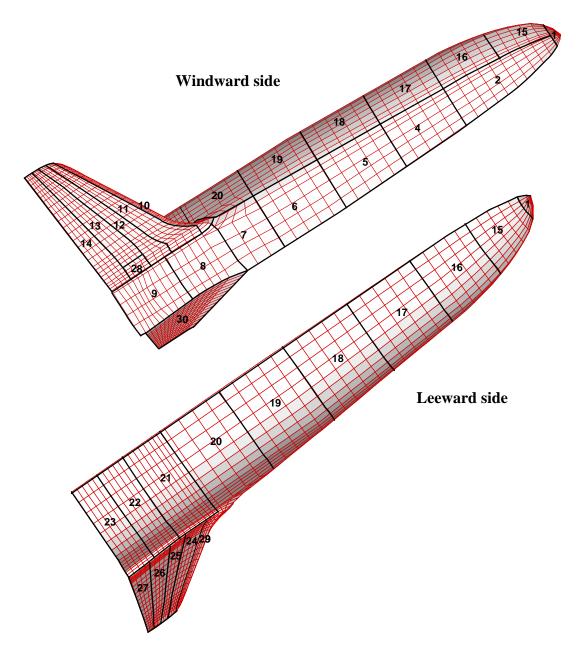
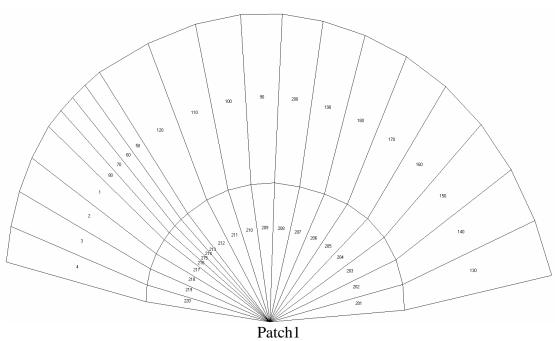


Figure 5.2. Twenty nine patches defined over TPS



377	61								
365	71	62 72	63						
449	37	33	73	74 74 25	65 75	56 76	57		
437	38	34	30	26	21	17	13	78 78	69 79
425	39	35	31	27	23	18	14	10	5
413	40	36	32	28	24	20	16	12	7 8

Patch 2

382	381	380	379	378
370	369	368	367	366
454	453	452	451	450
442	441	440	439	438
430	429	428	427	426
418	417	416	415	414

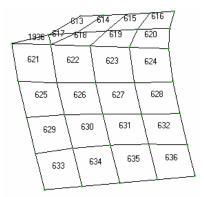
Patch 4

387	386	385	384	383
375	374	373	372	371
459	458	457	456	455
447	446	445	444	443
435	434	433	432	431
423	422	421	420	419

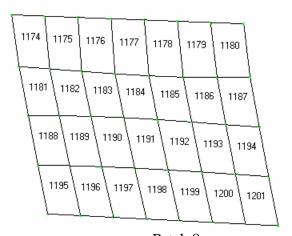
Patch5

523	519	515	511	388
524	520	516	512	376
1937	1938	1939	1940	460
1941	1942	1943	1944	448
1945	1946	1947	1948	436
1949	1950	1951	1952	424

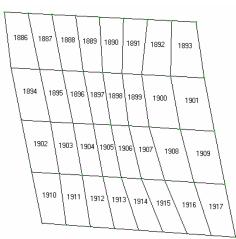
Patch 6



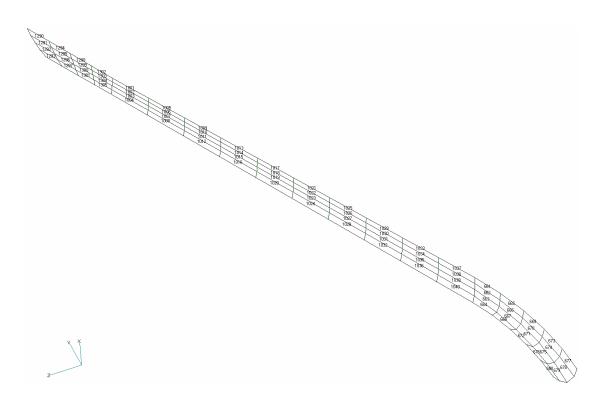
Patch 7



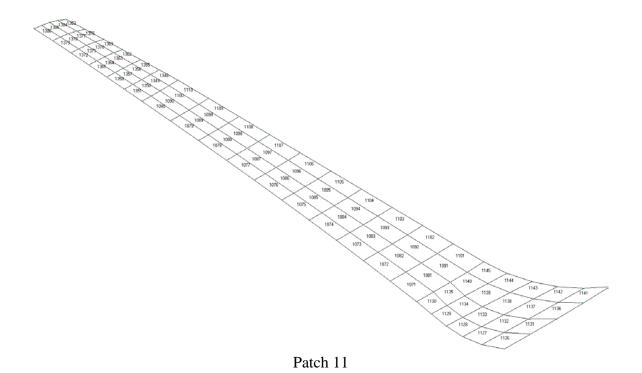
Patch 8

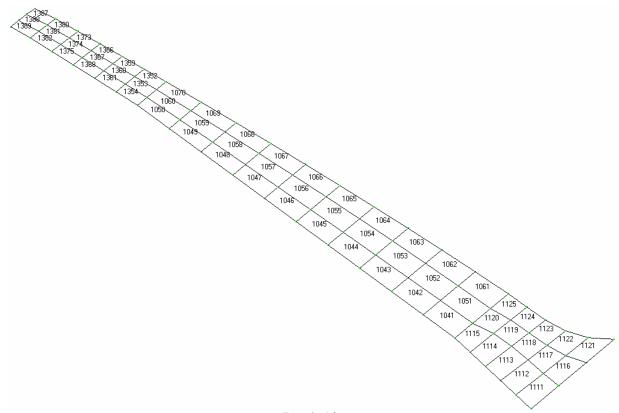


Patch 9

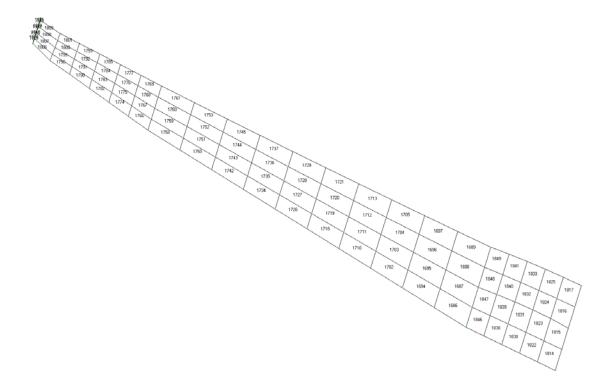


Patch 10

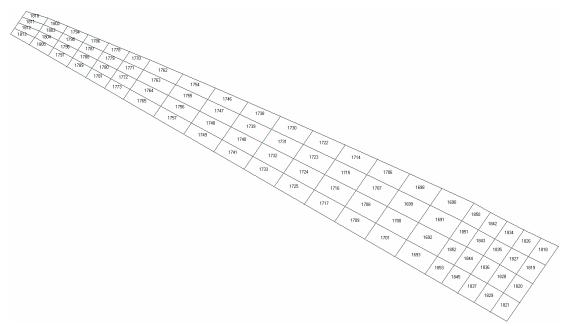




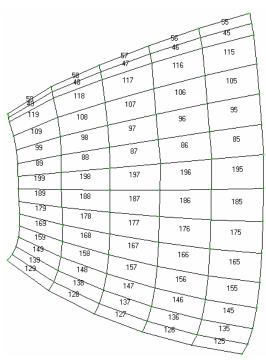
Patch 12



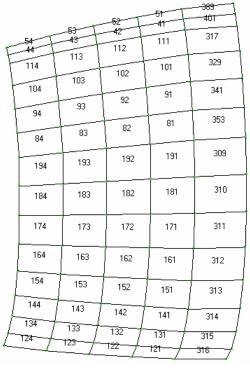
Patch 13



Patch 14



Patch 15



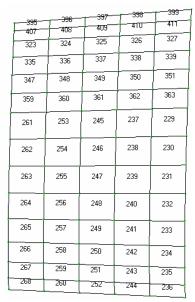
Patch 16

				- 394 -
	391 -		- 393 -	
390		404) 405	1 406 - 1
402	-403 -	T 404	,,,,,	
		320	321	322
318	319	320	J-21	
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301	293	285	277	269
301	233	200		
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302 J	294 [286	278	270
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303	295	287	279	271
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304	296 Í	288	280	272
1 1		-30	200	212
				
305 I	297	289	281	273
-3-		200	201	213
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306	298	290	282	274
	l			
307	299	- 291 - 	283	- 275 -
\ 308 ↓	380	292	- 284	
——-			-204	- 276 -

Patch 17

400-	- 510 1	- 514 	- 518 7	-522
400 412	- 509	513	517	521
l			497	493
328	505	501	437	455
340	506	502	498	494
352	507	503	499	495
364	508	504	500	496
221	485	477	469	461
222	486	478	470	462
223	487	479	471	463
224	488	480	472	464
225	489	481	473	465
226	490	482	474	466
227	491	483	475	467
220	492	- 484	476	468

Patch 19



Patch 18

612 611 610 609										
608	608 607 608 605									
601	597	593	589							
602	598	594	590							
603	599	595	591							
604	600	596	592							
581	573	565	557							
582	574	566	558							
583	575	567	559							
584	576	568	560							
585	577	569	561							
586	578	570	562							
587	579	571	563							
588	580	572	564							

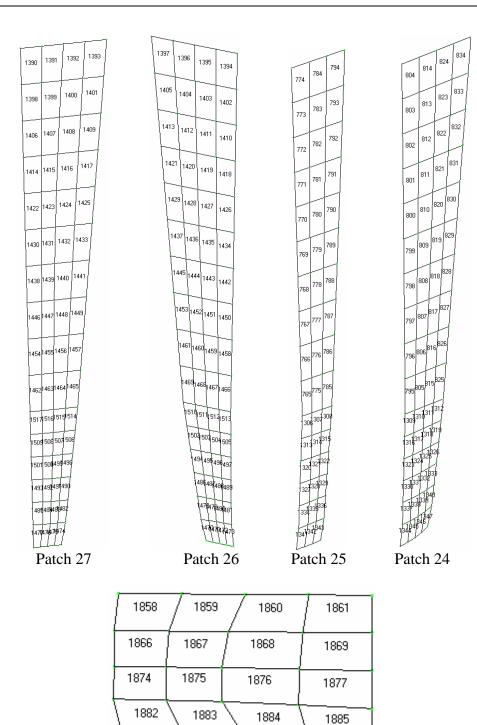
Patch 20

_			,		_		
717	718	719	720	938	939	940	941
721	722	723	724	945	946	947	948
725	726	727	728	952	953	954	955
729	730	731	732	959	960	961	962
757	749	741	733	1257	1256	1255	1254
758	750	742	734	1250	1249	1248	1247
759	751	743	735	1243	1242	1241	1240
760	752	744	736	1236	1235	1234	1233
761	753	745	737	1229	1228	1227	1226
762	754	746	738	1222	1221	1220	1219
763	755	747	739	1215	1214	1213	1212
764	756	748	740	1208	1207	1206	1205

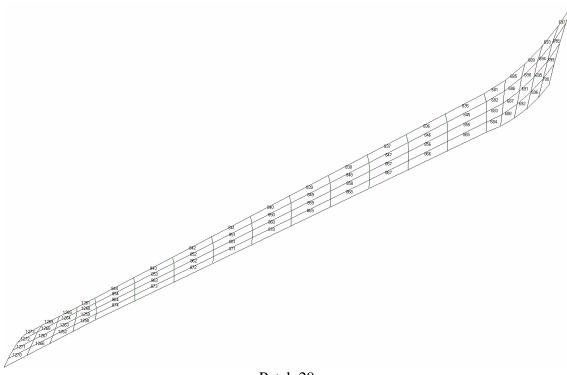
	_		_	
942	943	944	1590	1591
949	950	951	1598	1599
956	957	958	1606	1607
963	964	965	1614	1615
1253	1252	1251	1622	1623
1246	1245	1244	1630	1631
1239	1238	1237	1638	1639
1232	1231	1230	1646	1647
1225	1224	1223	1654	1655
1218	1217	1216	1662	1663
1211	1210	1209	1670	1671
1204	1203	1202	1678	1679

1592	1593	1594	1595	1596	1597
1600	1601	1602	1603	1604	1605
1608	1609	1610	1611	1612	1613
1616	1617	1618	1619	1620	1621
1624	1625	1626	1627	1628	1629
1632	1633	1634	1635	1636	1637
1640	1641	1642	1643	1644	1645
1648	1649	1650	1651	1652	1653
1656	1657	1658	1659	1660	1661
1664	1665	1666	1667	1668	1669
1672	1673	1674	1675	1676	1677
1680	1681	1682	1683	1684	1685

Patch 21 Patch 22 Patch 23



Patch 28



Patch 29

10015	10014	10013 110112 10011 10010 10000 10000 10007 10006 10005 10004 10003 10002 10001
10030	10029	10028 10027 10026 10025 10024 10023 10022 10021 10020 10019 10019 10017 10016
10045	10044	10043 10042 10041 10040 10039 10038 10037 10036 10035 10034 10033 10033 10032
10060	10059	10058 10057 10056 10055 10054 10053 10052 10052 10051 10059 10049 10048 10047 10046
10075	10074 1	100173 100172 10071 10070 10069 10068 10067 10065 10065 10065 10065 10065
10090	10089 10	0000 10001 10000 10005 10004 10003 10004 10001 10001 10001 10000 10009 10001 10007 10076
10105	10104 101	103 10102 10101 10100 10099 10099 10099 10099 10099 10099 10099 10095 10095 10095 10094
10120	10119 1011	00 00117 10115 10115 10114 10113 10112 10111 10110 10109 101008 10007 10106
10135	10134 10133	0 10022
10150	10149 10148	10144 10145 10144 10143 10144 10143 10141 10140 10139 10138 10137
10165	10164 10163	101002 101001 101100 101
10180	10179 10178 10	0117 /0018 /0018 /0018 /0018 /10181 /10181 /10181 /10181 /10180 /10180 /10181 10186
10195	10194 10193 1015	22 10024 10024 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000
102101	0209 10208 10207	have have have fram fram fram fram fram fram fram fram

Patch 30

Figure 5.3. Individual view of the twenty nine patches

5.4 Thermal Structures for TPS Patches

Two sets of TPS structures are used for the Micro-X surface. The first one using 5 layers is for the nose (patch 1) and the wings (patches 10, 29 and 30), and the second one consisting of 4 layers is for the remaing patches.

The thermal structures specified for the first set TPS using the STTYPE numbers 11, 12, 13, 14, 15 are Thin skin, Radiation gap, Slab, Thin skin and Slab and the corresponding optimization materials are 256 (ACC((N)), 129 (ZIRCONIUM), 225 (LI-2200 (N)), 245 (RTV-560), 247 (LB SIP) and the maximum temperatures for these materials are: $3260^{\circ}R$, $3160^{\circ}R$, $1010^{\circ}R$ and $1060^{\circ}R$.

The structures specified for the second set TPS using the STTYPE numbers 21, 42, 23, 24 are Thin skin, Slab, Thin skin and Slab. The corresponding optimization materials are 221 (HRSI COAT), 224 (LI-900 (P)), 245 (RTV-560) and 247 (LB SIP) and the maximum temperatures for these materials are: $2760^{\circ}R$, $2760^{\circ}R$, $1010^{\circ}R$ and $1060^{\circ}R$.

No structure layers are defined for the TPS. That means that all layer's thinkness may be changed during computation of optimization.

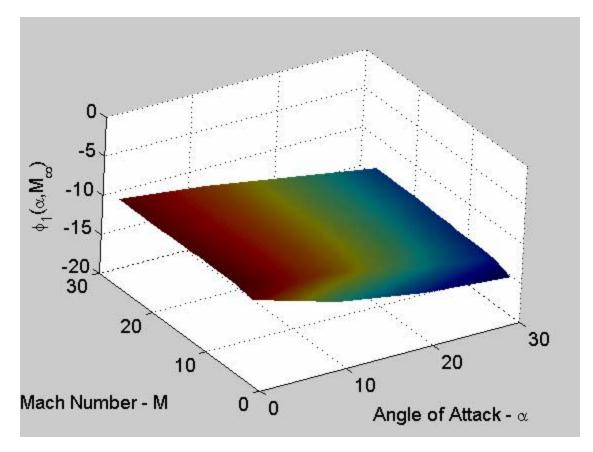
5.5 Output Information

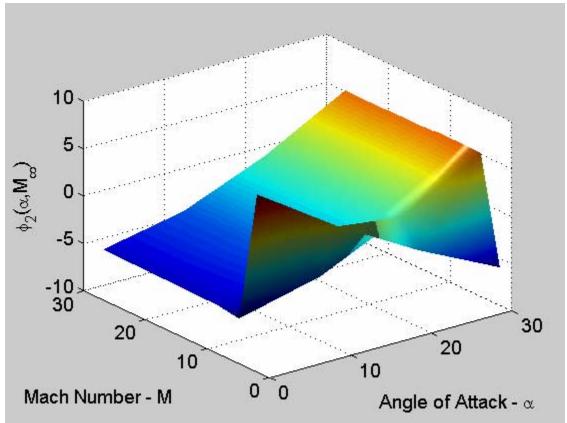
The output information consists of the following items:

- (1) Response surface data of Cp and velocities for POD analysis (Tecplot files).
- (2) C_p and temperature data at specified times (Tecplot files).
- (3) Schematic plotting of trajectory related thermal quantities versus time over every patch. These quantities include enthalpy-based heat transfer coefficient, adiabatic wall enthalpy, and pressure.
- (4) Optimal thickness of each design layer and the ratio of the final objective function to that computed using the initial thickness.
- (5) Schematic plotting of optimal thickness and maximum temperature over each layer for every patch.
- (6) Optimal thickness data of each layer of each panel (Tecplot file).

5.6 Results

The output items listed in Section 5.5 have been stored in a ASCII text file and some plotting files. The test file is the Standard Output File (MICRO_X_TPS.OUT) which includes all the input information appearing in the Standard Input File (MICRO_X_TPS.INP) and items (3)-(5) listed in the above section. Figures 5.4-5.7 show the Response surfaces of C_p , C_p and temperature plottings at a specified time in the trajectory bulk data card, and the optimal thickness, respectively.





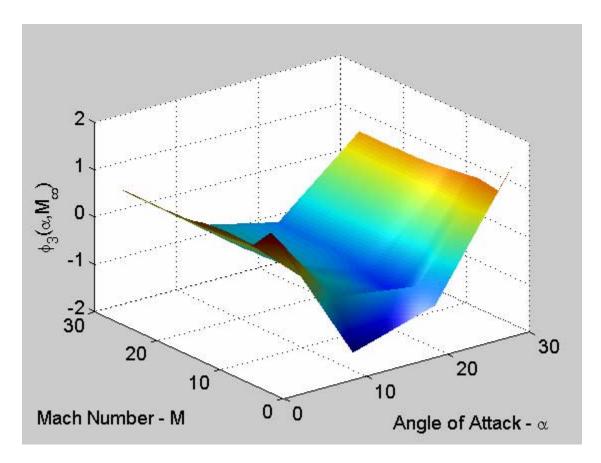


Figure 5.4. Response surfaces of the first three modes in POD analysis

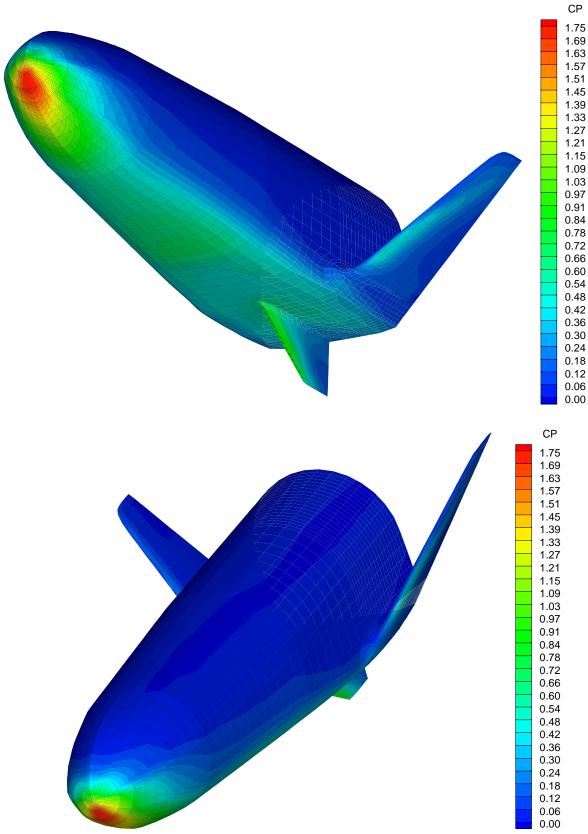


Figure 5.5. Plots of C_p at time=990 with M=21.7 and AoA=30 $^\circ$

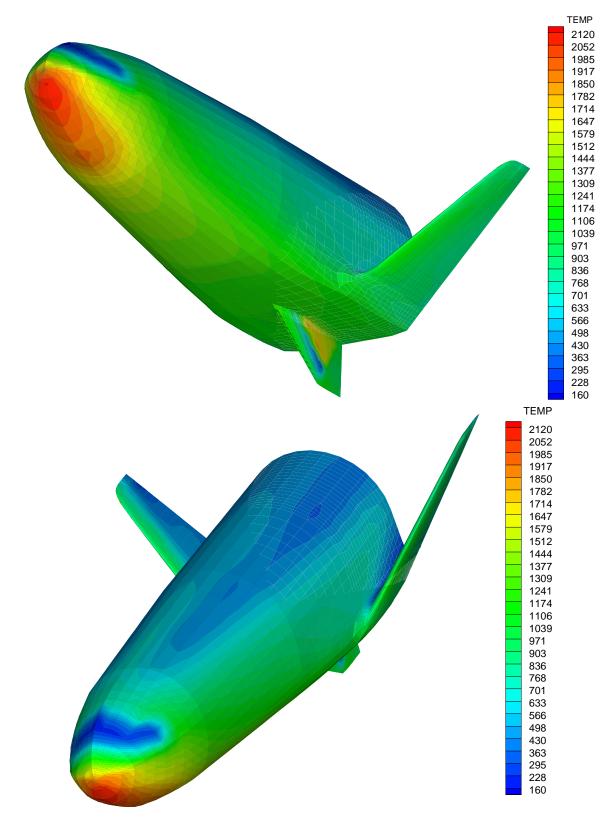
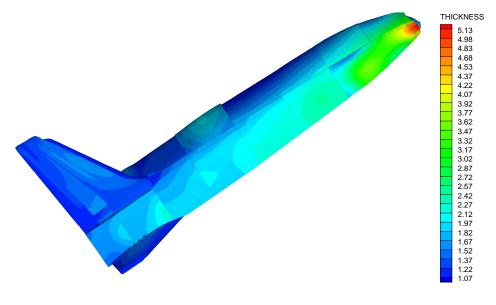
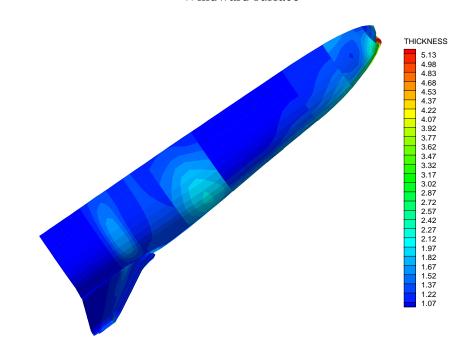


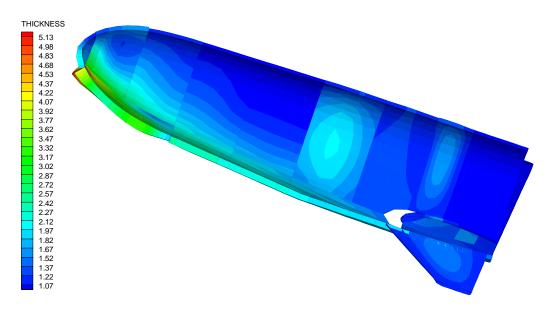
Figure 5.6. Plots of temperature at time=990 with M=21.7 and AoA=30°



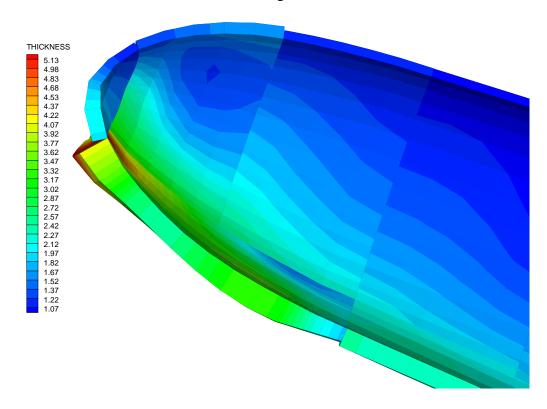
Windward surface



Leeward surface



Intersection view through middle vertical line



Enlargened intersection view

Figure 5.7. Optimal thickness plot (Thickness scaling factor=2.5)

5.7 Lists of Input and Output Files

Listing 5.1 Standard input File: MICRO_X_TPS.INP

```
ASSIGN AEROBASE='CTRTABLE.DAT', PRINT=0
$ Begin Executive Control Section
CEND
ECHO = SORT
SUBCASE = 1
        SUBTITLE=TPS OPTIMISATION FOR MICRO-X
        LABEL= HYPERSONIC AERODYNAMIC ANALYSIS
        TPSDES=1
BEGIN BULK
$ PLOTTING AERODYNAMIC MODEL
PLTAERO 1
                YES
                         NΟ
                                         TECPLOT MICRO_X_GEO.PLT
PLTAERO 1
                YES
                         NO
                                         NASTRAN MICRO_X_GEO.NAS
$ POLTTING TPS THICKNESS
                                 TECPLOT MICRO_X_HT.PLT 0.05
PLTTPS 1
                1
                         ALL
PLTTPS -2
                1
                         ALL
                                 TECPLOT MICRO_X_HT1.PLT -2.5
$TPSDES SETID
                PODRSM
                         TRJLST IFPREH IDFEM/TPSSYM
TPSDES 1
                                                                           CONT
                1
                         1
                                 2
CONT
                 2
                         30
                                                                   8
                                                                           CONT
CONT
                10
                         11
                                 12
                                         13
                                                          15
                                                                   16
                                                                           CONT
                                                  14
CONT
        17
                18
                         19
                                 20
                                          21
                                                  22
                                                          23
                                                                   24
                                                                           CONT
CONT
        25
                 26
                         27
                                 28
                                          29
$PODRSM | TPSDES | METHOD | NRDMOD | TOLER | NEURON | SAVE
                                                          FILENM
PODRSM 1
                                                   ACQU
                                                           MICRO-X1.RST
                                                                           CONT
                         UPODRSM.P3D
                                                           WPODRSM.P3D
CONT
        CPPODRSM.P3D
                                          VPODRSM.P3D
        THERMAL STRUCTURES FOR NOSE SECTION
Ś
STTYPE 11
                 6
                         256
                                                                           CONT
CONT
        0.03
STTYPE
        12
                         129
                                 129
                                                                           CONT
                 0.03
CONT
        0.03
                         0.5
STTYPE
                                                                           CONT
        13
                 1
                         225
CONT
        2.0
STTYPE
        14
                         245
                                                                           CONT
                  6
CONT
        0.008
STTYPE
        15
                 1
                         247
                                                                           CONT
CONT
        0.16
STTYPE 21
                  6
                         221
                                                                           CONT
        0.05
CONT
STTYPE
        22
                         225
                                                                           CONT
CONT
        3.0
STTYPE
        23
                         245
                                                                           CONT
CONT
        0.008
STTYPE
        24
                 1
                         247
                                                                           CONT
CONT
        0.16
STTYPE 42
                         224
                                                                           CONT
                 1
        3.0
CONT
STPSSYM SETID
                IDPATCH NLAYER
TPSSYM 1
                 1
                         5
                                                                           CONT
CONT
                 11
                         0.01
                                                                           CONT
        1
                                 2.
CONT
        1
                 12
                         0.01
                                 1.28333
                                                                           CONT
CONT
                 13
                         1.0
                                 10.
                                                                           CONT
        1
                         0.001
CONT
        1
                 14
                                 1.28333
                                                                           CONT
                                 1.28333
CONT
        1
                 15
                         0.05
                                                                           CONT
TPSSYM
        2
                  2
CONT
                  21
                         0.01
                                                                           CONT
CONT
        2
                                                                           CONT
                  22
                         1.
                                 10.
CONT
        2
                  23
                         0.001
                                 1.5
                                                                           CONT
CONT
        2
                 24
                         0.05
                                 1.28333
TPSSYM
        4
                  4
                         4
                                 4
                                                                           CONT
                  21
                         0.01
                                                                           CONT
CONT
```

CONT	4	42	1.0	10.	CONT
CONT	4	23	0.001	1.5	CONT
					COIVI
CONT	4	24	0.05	1.4	
TPSSYM	5	5	4	4	CONT
CONT	5	21	0.01	2.	CONT
CONT	5	42	1.0	10.	CONT
CONT	5	23	0.001	1.5	CONT
CONT	5	24	0.05	1.4	
TPSSYM	6	6	4	4	CONT
CONT	6	21	0.01	2.	CONT
CONT	6	42	1.0	10.	CONT
CONT	6	23	0.001	1.5	CONT
					00111
CONT	6	24	0.05	1.4	
TPSSYM	7	7	4	4	CONT
CONT	7	21	0.01	2.	CONT
CONT	7	42	1.0	10.	CONT
CONT	7	23	0.001	1.5	CONT
CONT	7	24	0.05	1.4	
					CONTE
TPSSYM	8	8	4	4	CONT
CONT	8	21	0.01	2.	CONT
CONT	8	42	1.0	10.	CONT
	8	23		1.5	
CONT			0.001		CONT
CONT	8	24	0.05	1.4	
TPSSYM	9	9	4	4	CONT
CONT	9	21	0.01	2.	CONT
CONT	9	42	1.0	10.	CONT
CONT	9	23	0.001	1.5	CONT
CONT	9	24	0.05	1.4	
TPSSYM	10	10	5	4	CONT
CONT	10	11	0.01	2.	CONT
CONT	10	12	0.01	1.28333	CONT
CONT	10	13	1.0	10.	CONT
CONT	10	14	0.001	1.28333	CONT
CONT	10	15	0.05	1.28333	
					CONTE
TPSSYM	11	11	4	4	CONT
CONT	11	21	0.01	2.	CONT
CONT	11	42	1.0	10.	CONT
CONT	11	23	0.001	1.5	CONT
CONT	11	24	0.05	1.4	
TPSSYM	12	12	4	4	CONT
CONT	12	21	0.01	2.	CONT
CONT	12	42	1.0	10.	CONT
CONT	12	23	0.001	1.5	CONT
CONT	12	24	0.05	1.4	
TPSSYM	13				
CONT	1 2	13	4	4	CONT
	13				
		21	0.01	2.	CONT
CONT	13	21 42	0.01	2. 10.	CONT CONT
CONT	13 13	21 42 23	0.01	2. 10. 1.5	CONT
	13	21 42	0.01	2. 10.	CONT CONT
CONT CONT	13 13 13	21 42 23 24	0.01 1.0 0.001 0.05	2. 10. 1.5 1.4	CONT CONT
CONT CONT TPSSYM	13 13 13 14	21 42 23 24 14	0.01 1.0 0.001 0.05 4	2. 10. 1.5 1.4	CONT CONT CONT
CONT CONT TPSSYM CONT	13 13 13 14	21 42 23 24 14 21	0.01 1.0 0.001 0.05 4 0.01	2. 10. 1.5 1.4 4	CONT CONT CONT CONT
CONT CONT TPSSYM	13 13 13 14	21 42 23 24 14	0.01 1.0 0.001 0.05 4 0.01 1.0	2. 10. 1.5 1.4	CONT CONT CONT
CONT CONT TPSSYM CONT CONT	13 13 13 14 14	21 42 23 24 14 21 42	0.01 1.0 0.001 0.05 4 0.01 1.0	2. 10. 1.5 1.4 4 2.	CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT	13 13 13 14 14 14 14	21 42 23 24 14 21 42 23	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5	CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT CONT	13 13 13 14 14 14 14 14	21 42 23 24 14 21 42 23 24	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT CONT TPSSYM	13 13 13 14 14 14 14	21 42 23 24 14 21 42 23	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5	CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT CONT	13 13 13 14 14 14 14 14	21 42 23 24 14 21 42 23 24	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT	13 13 14 14 14 14 14 15 15	21 42 23 24 14 21 42 23 24 15 21	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2.	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT TPSSYM CONT CONT	13 13 14 14 14 14 14 15 15	21 42 23 24 14 21 42 23 24 15 21 42	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10.	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT TPSSYM CONT CONT CONT	13 13 14 14 14 14 14 15 15 15	21 42 23 24 14 21 42 23 24 15 21 42 23	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 1.5 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT TPSSYM CONT CONT	13 13 14 14 14 14 14 15 15	21 42 23 24 14 21 42 23 24 15 21 42	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10.	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT	13 13 14 14 14 14 14 15 15 15 15	21 42 23 24 14 21 42 23 24 15 21 42 23 24	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 1.5 1.4 4 2. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT TPSSYM CONT CONT CONT CONT CONT TPSSYM	13 13 14 14 14 14 14 15 15 15 15	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 1.5 1.4 4 4 2. 1.5 1.4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT TPSSYM CONT CONT CONT CONT TONT TONT CONT CONT	13 13 14 14 14 14 14 15 15 15 16 16	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 1.5 1.4 4 2. 1.0. 1.5 1.4 4 2.	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT TPSSYM CONT CONT CONT CONT CONT TPSSYM	13 13 14 14 14 14 14 15 15 15 15	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 1.5 1.4 4 4 2. 1.5 1.4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT	13 13 14 14 14 14 14 15 15 15 15 16 16	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10.	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT TPSSYM CONT CONT	13 13 14 14 14 14 15 15 15 15 16 16 16	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT TOONT CONT CONT CONT CONT CON	13 13 14 14 14 14 15 15 15 15 16 16 16 16	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT TPSSYM CONT CONT	13 13 14 14 14 14 15 15 15 15 16 16 16	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT TOONT CONT CONT CONT CONT CON	13 13 14 14 14 14 15 15 15 15 16 16 16 16	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT TPSSYM CONT TPSSYM CONT TPSSYM CONT TONT TONT TONT TONT TONT TONT TONT	13 13 14 14 14 14 15 15 15 15 16 16 16 16 17	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24 17 21	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2.	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT CONT	13 13 14 14 14 14 15 15 15 15 16 16 16 16 17 17	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24 17 21 42	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10.	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT CONT	13 13 14 14 14 14 14 15 15 15 15 16 16 16 16 17 17 17	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24 17 21 42 23 24 23 24 21 22 23 24 24 23 24 24 25 26 27 27 27 27 27 27 27 27 27 27 27 27 27	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.55 1.4 4 2. 10. 1.55 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT CONT	13 13 14 14 14 14 15 15 15 15 16 16 16 16 17 17	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24 17 21 42	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10.	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT CONT	13 13 14 14 14 14 14 15 15 15 16 16 16 16 17 17 17	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24 17 21 42 23 24	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 1.0 0.001 0.05	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT CONT	13 13 14 14 14 14 15 15 15 15 16 16 16 16 17 17 17 17	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24 17 21 42 23 24 17 21	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT
CONT CONT TPSSYM CONT CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT TPSSYM CONT CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT CONT	13 13 14 14 14 14 14 15 15 15 16 16 16 16 17 17 17	21 42 23 24 14 21 42 23 24 15 21 42 23 24 16 21 42 23 24 17 21 42 23 24	0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.001 1.0 0.001 0.05	2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4	CONT CONT CONT CONT CONT CONT CONT CONT

CONT	18	42	1.0	10.			CONT
CONT	18	23	0.001	1.5			CONT
							CONT
CONT	18	24	0.05	1.4			
TPSSYM	19	19	4	4			CONT
CONT	19	21	0.01	2.			CONT
CONT	19	42	1.0	10.			CONT
CONT	19	23	0.001	1.5			CONT
CONT	19	24	0.05	1.4			
							CONTE
TPSSYM	20	20	4	4			CONT
CONT	20	21	0.01	2.			CONT
CONT	20	42	1.0	10.			CONT
CONT	20	23	0.001	1.5			CONT
	20	24	0.05	1.4			00111
CONT							G01777
TPSSYM	21	21	4	4			CONT
CONT	21	21	0.01	2.			CONT
CONT	21	42	1.0	10.			CONT
CONT	21	23	0.001	1.5			CONT
							COIVI
CONT	21	24	0.05	1.4			
TPSSYM	22	22	4	4			CONT
CONT	22	21	0.01	2.			CONT
CONT	22	42	1.0	10.			CONT
CONT	22	23	0.001	1.5			CONT
							CONT
CONT	22	24	0.05	1.4			
TPSSYM	23	23	4	4			CONT
CONT	23	21	0.01	2.			CONT
CONT	23	42	1.0	10.			CONT
CONT		23					
	23		0.001	1.5			CONT
CONT	23	24	0.05	1.4			
\$							
TPSSYM	24	24	4	4			CONT
CONT	24	21	0.01	2.			CONT
CONT	24	42	1.0	10.			CONT
CONT	24	23	0.001	1.5			CONT
CONT	24	24	0.05	1.4			
TPSSYM	25	25	4	4			CONT
CONT	25	21	0.01	2.			CONT
CONT	25	42	1.0	10.			CONT
CONT	25	23	0.001	1.5			CONT
CONT	25	24	0.05	1.4			
TPSSYM	26	26	4	4			CONT
CONT	26	21	0.01	2.			CONT
CONT	26	42	1.0	10.			CONT
CONT	26	23	0.001	1.5			CONT
CONT	26	24	0.05	1.4			
TPSSYM	27	27	4	4			CONT
	27			2.			
CONT		21	0.01				CONT
CONT	27	42	1.0	10.			CONT
CONT	27	23	0.001	1.5			CONT
CONT	27	24	0.05	1.4			
TPSSYM	28	28	4	4			CONT
			0.01	2.			
CONT	28	21					CONT
CONT	28	42	1.0	10.			CONT
CONT	28	23	0.001	1.5			CONT
CONT	28	24	0.05	1.4			
TPSSYM	29	29	5	4			CONT
CONT	29	11	0.01	2.			CONT
CONT	29	12	0.01	1.28333			CONT
CONT	29	13	1.0	10.			CONT
CONT	29	14	0.001	1.28333			CONT
CONT	29	15	0.05	1.28333			
							CONTE
TPSSYM	30	30	5	4			CONT
CONT	30	11	0.01	2.			CONT
CONT	30	12	0.01	1.28333			CONT
CONT	30	13	1.0	10.			CONT
CONT	30	14	0.001	1.28333			CONT
							CONT
CONT	30	15	0.05	1.28333			
\$							
	4						
\$ PRVAL							
\$ PRVAL \$	4	RHSDAN	RHSHOT	SYMY	YVAT.	ттмпср	
\$ PRVAL \$ \$PATCH	4 ID	RHSPAN		SYMY	YVAL	TIMESP	
\$ PRVAL \$	4	RHSPAN 1	RHSHOT	SYMY	YVAL	TIMESP	

```
$ ALL PANELS for Patch 1
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                              1 2 3 4 50 60+PN1101
                      70
                                   8.0
                                                              100
                                                                                         120
+PN1101
                                                  90
                                                                            110
                                                                                                       130
                                                                                                                     140+PN1102
                                                 170
                                                               180
                                                                                                       201
+PN1102
                      150
                                   160
                                                                            190
                                                                                          200
                                                                                                                     202+PN1103
                      203
                                   204
                                                 205
                                                               206
                                                                            207
+PN1103
                                                                                          208
                                                                                                       209
                                                                                                                     210+PN1104
                      211
                                   212
+PN1104
                                                 213
                                                               214
                                                                                                        217
                                                                                                                     218+PN1105
+PN1105
                     219
                                   220
$ DESVAR for Patch 1
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                      130
                                   201
                       90
                                   209
                       4
                                220
$ HOT PANELS FOR Patch 1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
             101 130 201 90 209 4 220 CONT
PANLST2
                     170
CONT
$
                      2
PATCH 2
                                        102
$ PANLST2 for Patch 2 (+3)
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANLST2
               2
                                       5 6 7 8 9 10+PN1201
+PN1201
                       11
                                    12
                                                  13
                                                                14
                                                                              15
                                                                                           16
                                                                                                         17
                                                                                                                       18+PN1202
+PN1202
                       19
                                     2.0
                                                  21
                                                                22
                                                                              23
                                                                                           24
                                                                                                         65
                                                                                                                       66+PN1203
                       67
                                                                75
                                                                                          77
+PN1203
                                  68
                                                 69
                                                                              76
                                                                                                         78
                                  26
                                                                                           30
CONT
                       25
                                                  27
                                                                28
                                                                              29
                                                                                                         31
                                                                                                                      32 CONT
CONT
                       33
                                    34
                                                  35
                                                                36
                                                                              37
                                                                                            38
                                                                                                         39
                                                                                                                       40 CONT
                                  62
                                                                                          72
                      61
                                                  63
                                                                64
                                                                              71
                                                                                                         73
                                                                                                                      74 CONT
CONT
CONT
                     365
                                   377
                                                 413
                                                               425
                                                                            437
                                                                                          449
$ DESVAR for Patch 2
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
DESVAR
                 2 3
                                                 4
CONT
                         8
                                       6
                                                  69
                                                                                                                            CONT
                                   18
CONT
                       2.0
                                                  66
                                                                                                                            CONT
CONT
                       32
                                   30
                                                 63
                                                                                                                            CONT
CONT
                     413
                                437
                                                 377
Ś
                      4 104
$ PANLST2 for Patch 4
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2
              4 366
                                                               367 368 369 370 378+PN1401
+PN1401
                     379
                                   380
                                                 381
                                                               382
                                                                            414
                                                                                         415
                                                                                                        416
                                                                                                                     417+PN1402
+PN1402
                      418
                                    426
                                                 427
                                                               428
                                                                            429
                                                                                          430
                                                                                                        438
                                                                                                                     439+PN1403
+PN1403
                     440
                                   441
                                                442
                                                              450
                                                                           451
                                                                                         452
                                                                                                       453
$ DESVAR for Patch 4
\$...1.. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
DESVAR 4 3 3
+DE1401
                     418
                                   416
                                                 414
                                                                                                                          +DE1402
+DE1402
                      442
                                   440
                                                 438
                                                                                                                          +DE1403
                     382 380
+DE1403
                                                 378
                     5 105
PATCH 5
                                                                                     1
$ PANLST2 for Patch 5
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANLST2
                                                 371 372 373 374 375 383+PN1501
                 5
+PN1501
                      384
                                   385
                                                 386
                                                               387
                                                                            419
                                                                                          420
                                                                                                        421
                                                                                                                     422+PN1502
+PN1502
                      423
                                   431
                                                 432
                                                               433
                                                                            434
                                                                                         435
                                                                                                       443
                                                                                                                     444+PN1503
+PN1503
                    445
                                   446
                                                 447
                                                               455
                                                                            456
                                                                                         457
                                                                                                       458
                                                                                                                    459
$ DESVAR for Patch 5
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
DESVAR
                5
                                   3 3
                                                                                                                           +DE1501
+DE1501
                      423
                                    421
                                                 419
                                                                                                                          +DE1502
+DE1502
                   447
                                                 443
                                                                                                                          +DE1503
                                   445
```

```
+DE1503
          387
                   385
                          383
            6 106
PATCH 6
                                              1
$ PANLST2 for Patch 6
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
         6 376 388 424 436 448 460+PN1601
511 512 515 516 519 520 523 524+PN1602
PANLST2
          1938
1945
195
                                        1941
                                                       1943
                                                               1944+PN1603
+PN1602
                         1939
                                 1940
                                                1942
+PN1603
                         1947
                                 1948
                                        1949
                                                1950
                                                       1951
                                                               1952
$ DESVAR for Patch 6
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
          6 3 3
1949 1951 424
DESVAR
                                                                  +DE1602
+DE1601
         1941 1943
                                                                  +DE1603
          523 515
+DE1603
                          388
PATCH 7
                   107
                                              1
$ PANLST2 for Patch 7
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                       613 614 615 616 617 618+PN1701
621 622 623 624 625 626+PN1702
PANLST2
                          621
            619
                   620
                                  622
                                         623
           627
+PN1702
                   628
                          629
                                  630
                                         631
                                                 632
                                                        633
                                                               634+PN1703
+PN1703
           635
                   636
                         1936
$ DESVAR for Patch 7
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
           7 3 3
633 635 636
DESVAR
                                                                  +DE1701
           625
613
                   627
615
+DE1702
                          628
                                                                  +DE1703
+DE1703
                          616
                     108
PATCH 8
$ PANLST2 for Patch 8
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                       1174 1175 1176 1177 1178 1179+PN1801
          1180 1181
                                        1184 1185
                                                       1186
+PN1801
                         1182
                                 1183
                                                              1187+PN1802
+PN1802
           1188
                  1189
                         1190
                                 1191
                                        1192
                                                1193
                                                       1194
                                                              1195+PN1803
                                              1201
+PN1803
                         1198
          1196
                  1197
                                 1199
                                        1200
$ DESVAR for Patch 8
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
         8 3 3
          1195 1198
+DE1801
                         1201
                                                                  +DE1802
+DE1802
           1181
                 1184
                         1187
                                                                  +DE1803
          1174 1177 1180
+DE1803
PATCH 9
                     109
                                              1
$ PANLST2 for Patch 9
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANLST2 9
                       1886
                                 1887 1888 1889 1890 1891+PN1901
           1892
                  1893
                         1894
                                 1895
                                        1896
                                               1897
                                                       1898
+PN1901
                                                               1899+PN1902
          1900
                  1901
                                 1903
+PN1902
                         1902
                                        1904
                                                1905
                                                       1906
                                                               1907+PN1903
+PN1903
         1908
                1909
                         1910
                                 1911
                                        1912
                                              1913
                                                       1914
+PN1904
          1916
                  1917
$ DESVAR for Patch 9
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                    3
          9 3
1910 1914
DESVAR
+DE1901
                         1917
                                                                  +DE1902
+DE1902
         1894 1898
                                                                  +DE1903
+DE1903
         1886 1890
                        1893
PATCH 10 10 110
                                              1
$ PANLST2 for Patch 10
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANLST2
          10
                        661 662 663 664 665 666+CON
           667
                   668
                          669
                                  670
                                         671
                                                672
                                                        673
                  676
                         677
+CON
           675
                                 678
                                         679
                                                680
                                                       1001
                                                               1002+CON
+CON
           1003
                  1004
                         1005
                                 1006
                                        1007
                                               1008
                                                       1009
                                                               1010+CON
                                              1016
          1011
                 1012
                        1013
                                1014
                                        1015
                                                       1017
+CON
                                                             1018+CON
```

```
+CON
           1019
                   1020
                            1021
                                    1022
                                            1023
                                                   1024
                                                             1025
                                                                     1026+CON
+CON
            1027
                    1028
                            1029
                                    1030
                                            1031
                                                    1032
                                                             1033
                                                                     1034+CON
+CON
            1035
                    1036
                            1037
                                    1038
                                             1039
                                                     1040
                                                             1290
                                                                     1291+CON
                    1293
                            1294
                                    1295
                                            1296
                                                    1297
+CON
            1292
                                                             1298
                                                                     1299+CON
+CON
            1300
                    1301
                            1302
                                    1303
                                             1304
                                                     1305
$ DESVAR for Patch 10
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR
            10
                      4
                              4
+DE2001
            1290
                    1291
                            1292
                                    1293
                                                                         +DE2002
            1017
                    1018
                            1019
                                    1020
                                                                         +DE2003
+DE2002
                            1039
                                    1040
+DE2003
            1037
                    1038
                                                                         +DE2004
+DE2004
            677
                     678
                             679
                                     680
PATCH 29
             29
                        129
                                                   1
$ DESVAR for Patch 29
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
          29
                                                                         +DE2001
                4 4
                            1271
+DE2001
            1273
                    1272
                                    1270
                                                                         +DE2002
+DE2002
            840
                    850
                             860
                                     870
                                                                         +DE2003
+DE2003
            835
                     845
                             855
                                     865
                                                                         +DE2004
            697
+DE2004
                     698
                             699
                                     700
$ PANLST2 for Patch 29
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                             681 682 683
           29
                                                  684
                                                           685
                                                                      686+CON
PANLST2
                             689
+CON
             687
                     688
                                     690
                                              691
                                                      692
                                                              693
                                                                      694+CON
+CON
             695
                     696
                             697
                                     698
                                              699
                                                      700
                                                              835
                                                                      836+CON
+CON
             837
                     838
                             839
                                     840
                                              841
                                                      842
                                                              843
                                                                      844+CON
+CON
             845
                     846
                             847
                                     848
                                              849
                                                      850
                                                              851
                                                                      852+CON
+CON
             853
                     854
                             855
                                     856
                                              857
                                                      858
                                                              859
                                                                      860+CON
             861
                     862
                             863
                                     864
                                              865
                                                      866
                                                              867
+CON
                                                                      868+CON
            869
                     870
                             871
                                     872
                                             873
                                                     874
                                                             1258
+CON
                                                                     1259+CON
+CON
            1260
                    1261
                            1262
                                    1263
                                            1264
                                                    1265
                                                             1266
                                                                     1267+CON
            1268
                   1269
                            1270
                                    1271
                                            1272
                                                    1273
+CON
PATCH 30
            3.0
                         130
$ DESVAR for Patch 30
                       3
DESVAR
           30
                                                                         +DE2001
+DE2001 10210 10201
                        10196
                                                                         +DE2002
+DE2002 10105 10096
                        10091
                                                                         +DE2003
+DE2003 10015
              10006
                        10001
$ PANLST2 for Patch 30
PANLST2
           30
                           10001
                                   10002
                                           10003
                                                    10004
                                                            10005
                                                                    10006+CON
+CON
           10007
                   10008
                          10009
                                   10010
                                           10011
                                                    10012
                                                            10013
                                                                    10014+CON
+CON
                                                    10020
           10015
                   10016
                           10017
                                   10018
                                           10019
                                                            10021
                                                                    10022+CON
+CON
           10023
                   10024
                           10025
                                   10026
                                            10027
                                                    10028
                                                            10029
                                                                    10030+CON
                                                            10037
           10031
                   10032
                           10033
                                   10034
                                           10035
                                                    10036
+CON
                                                                    10038+CON
           10039
                   10040
                           10041
                                   10042
                                           10043
                                                    10044
                                                            10045
                                                                    10046+CON
+CON
           10047
                   10048
                           10049
                                   10050
                                           10051
                                                    10052
                                                            10053
                                                                    10054+CON
+CON
+CON
           10055
                   10056
                           10057
                                   10058
                                           10059
                                                    10060
                                                            10061
                                                                    10062+CON
+CON
           10063
                   10064
                           10065
                                   10066
                                           10067
                                                    10068
                                                            10069
                                                                    10070+CON
                           10073
                                   10074
                                           10075
+CON
           10071
                   10072
                                                    10076
                                                            10077
                                                                    10078+CON
           10079
+CON
                   10080
                           10081
                                   10082
                                            10083
                                                    10084
                                                            10085
                                                                    10086+CON
+CON
           10087
                   10088
                           10089
                                   10090
                                           10091
                                                    10092
                                                            10093
                                                                    10094+CON
+CON
           10095
                   10096
                           10097
                                   10098
                                           10099
                                                    10100
                                                            10101
                                                                    10102+CON
+CON
           10103
                   10104
                           10105
                                   10106
                                           10107
                                                    10108
                                                            10109
                                                                    10110+CON
+CON
           10111
                   10112
                           10113
                                   10114
                                           10115
                                                    10116
                                                            10117
                                                                    10118+CON
+CON
           10119
                   10120
                           10121
                                   10122
                                           10123
                                                    10124
                                                            10125
                                                                    10126+CON
                           10129
+CON
           10127
                   10128
                                   10130
                                           10131
                                                    10132
                                                            10133
                                                                    10134+CON
+CON
           10135
                   10136
                           10137
                                   10138
                                            10139
                                                    10140
                                                            10141
                                                                    10142+CON
           10143
                   10144
                           10145
                                   10146
                                           10147
                                                    10148
                                                            10149
+CON
                                                                    10150+CON
           10151
                   10152
                          10153
                                   10154
                                           10155
                                                    10156
                                                            10157
                                                                    10158+CON
+CON
+CON
           10159
                   10160
                           10161
                                   10162
                                           10163
                                                    10164
                                                            10165
                                                                    10166+CON
+CON
           10167
                   10168
                           10169
                                   10170
                                           10171
                                                    10172
                                                            10173
                                                                    10174+CON
+CON
           10175
                   10176
                           10177
                                   10178
                                           10179
                                                    10180
                                                            10181
                                                                    10182+CON
+CON
           10183
                   10184
                           10185
                                   10186
                                           10187
                                                    10188
                                                            10189
                                                                    10190+CON
+CON
           10191
                   10192
                           10193
                                   10194
                                            10195
                                                    10196
                                                            10197
                                                                    10198+CON
           10199
                                                            10205
+CON
                   10200
                           10201
                                   10202
                                            10203
                                                    10204
                                                                    10206+CON
                   10208
                           10209
                                   10210
                                            10421
                                                    10422
                                                            10423
+CON
           10207
                                                                    10424+CON
+CON
           10425
                   10426
                           10427
                                   10428
                                           10429
                                                    10430
                                                            10431
                                                                    10432+CON
+CON
           10433
                   10434
                           10435
Ś
```

```
PATCH 11
                    11
                                    111
                                                                               1
$ PANLST2 for Patch 11
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                         1071 1072 1073 1074 1075 1076+PN2101
             11
                  1077
                               1078
                                                                               1082
+PN2101
                                            1079
                                                         1080
                                                                   1081
                                                                                               1083
                                                                                                           1084+PN2102
+PN2102
                   1085
                               1086
                                            1087
                                                         1088
                                                                    1089
                                                                                 1090
                                                                                               1091
                                                                                                           1092+PN2103
                                                                              1098
                             1094
+PN2103
                   1093
                                            1095
                                                         1096
                                                                    1097
                                                                                               1099
                                                                                                           1100+PN2104
                                                                              1106
+PN2104
                 1101
                              1102
                                         1103
                                                         1104
                                                                   1105
                                                                                               1107
                                                                                                         1108+PN2105
                                         1126
                                                                             1129
                                                        1127
+PN2105
                  1109
                               1110
                                                                     1128
                                                                                               1130
                                                                                                           1131+PN2106
+PN2106
                   1132
                               1133
                                            1134
                                                         1135
                                                                     1136
                                                                                  1137
                                                                                               1138
                                                                                                            1139+PN2107
                                                                              1145
                 1140
                                        1142
                                                         1143
+PN2107
                              1141
                                                                   1144
                                                                                               1158
                                                                                                          1159+PN2108
                             1161
                                        1162
+PN2108
                 1160
                                                         1163
                                                                   1164 1165
                                                                                              1166
                                                                                                          1167+PN2109
+PN2109
                  1168
                               1169
                                            1170
                                                         1171
                                                                     1172
                                                                                  1173
                                                                                               1348
                                                                                                           1349+PN2110
                                                                               1358
                 1350
                               1351
                                           1355
                                                         1356
                                                                    1357
                                                                                                          1363+PN2111
+PN2110
                                                                                               1362
                 1364
                              1365
                                          1369
                                                         1370
                                                                     1371
                                                                              1372
                                                                                               1376
                                                                                                         1377+PN2112
+PN2111
+PN2112
                  1378
                             1379
                                           1383
                                                        1384
                                                                     1385
                                                                                1386
$ DESVAR for Patch 11
\$...1.. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
                  11 1385
                                 3 3
DESVAR
+DE2101
                                           1386
                                                                                                                  +DE2102
                   1107 1087 1077
+DE2103
                   1141 1131 1126
PATCH 12
                   12 112
                                                                               1
$ PANLST2 for Patch 12
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
               12
                                          1041 1042 1043 1044 1045 1046+PN2201
1049 1050 1051 1052 1053 1054+PN2202
PANLST2
                               1048
                                                                   1051
                   1047
                                         1049
                            1056
                                                                              1060
                                                                                                         1062+PN2203
                                        1057
                                                                  1059
+PN2202
                  1055
                                                         1058
                                                                                               1061
                   1063
                               1064
                                            1065
                                                         1066
                                                                     1067
                                                                                  1068
                                                                                               1069
+PN2203
                                                                                                           1070+PN2204
                                                                               1116
                                         1113
                                                                                               1117
+PN2204
                  1111
                               1112
                                                         1114
                                                                    1115
                                                                                                           1118+PN2205
+PN2205
                 1119
                              1120
                                         1121
                                                         1122
                                                                   1123
                                                                             1124
                                                                                               1125
                                                                                                          1146+PN2206
+PN2206
                  1147
                               1148
                                           1149
                                                         1150
                                                                    1151
                                                                                 1152
                                                                                               1153
                                                                                                           1154+PN2207
+PN2207
                  1155
                               1156
                                            1157
                                                         1352
                                                                     1353
                                                                                  1354
                                                                                               1359
                                                                                                            1360+PN2208
+PN2208
                 1361
                               1366
                                           1367
                                                         1368
                                                                     1373
                                                                                 1374
                                                                                              1375
                                                                                                           1380+PN2209
                  1381
                               1382
                                           1387
                                                        1388
+PN2209
                                                                     1389
$ DESVAR for Patch 12
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR
               12 3 3
+DE2201
                   1387
                               1388
                                            1389
                                                                                                                  +DE2202
+DE2202
                  1067
                             1057
                                            1047
+DE2203
                  1121
                             1116
                                           1111
                        13
PATCH 13
                                       113
$ PANLST2 for Patch 13
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
              13
                                        1686 1687 1688 1689 1694 1695+CON
1702 1703 1704 1705 1710 1711+CON
PANLST2
                            1697
                                         1702
+CON
                   1696
                                                                                                         1711+CON
                  1712 1713
                                        1718
                                                                             1721
+CON
                                                         1719
                                                                  1720
                                                                                               1726
                                                                                                         1727+CON
+CON
                   1728
                               1729
                                            1734
                                                         1735
                                                                     1736
                                                                                  1737
                                                                                               1742
                                                                                                            1743+CON
                               1745
                                                                                  1753
+CON
                   1744
                                           1750
                                                         1751
                                                                     1752
                                                                                               1758
                                                                                                           1759+CON
                 1760
                             1761
                                         1766
                                                         1767
                                                                   1768
                                                                               1769
                                                                                               1774
                                                                                                          1775+CON
+CON
                  1776
                               1777
                                           1782
                                                         1783
                                                                    1784
                                                                                 1785
                                                                                               1790
                                                                                                           1791+CON
+CON
                  1792
                               1793
                                            1798
                                                         1799
                                                                     1800
                                                                                  1801
                                                                                               1806
                                                                                                           1807+CON
+CON
                  1808
                               1809
                                           1814
                                                         1815
                                                                     1816
                                                                                1817
                                                                                               1822
                                                                                                           1823+CON
+CON
                   1824
                               1825
                                            1830
                                                         1831
                                                                     1832
                                                                                  1833
                                                                                               1838
                                                                                                           1839+CON
+CON
                  1840
                               1841
                                            1846
                                                         1847
                                                                     1848
                                                                                  1849
$ DESVAR for Patch 13
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
             13 3 3
1806 1808 1809
+DE2301
                  1734
1814
                               1736 1737
+DE2302
                                                                                                                  +DE2303
+DE2303
                              1816
                                           1817
PATCH 14
                                     114
                                                                               1
$ PANLST2 for Patch 14
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                         1690 1691 1692 1693 1698 1699+PN2401
PANLST2 14
```

```
+PN2401
             1700
                             1701
                                         1706
                                                        1707
                                                                   1708
                                                                               1709
                                                                                              1714
                                                                                                         1715+PN2402
                                         1722
                                                                                                         1731+PN2403
+PN2402
                  1716
                              1717
                                                         1723
                                                                     1724
                                                                                 1725
                                                                                               1730
+PN2403
                  1732
                               1733
                                            1738
                                                         1739
                                                                     1740
                                                                                  1741
                                                                                               1746
                                                                                                            1747+PN2404
                  1748
                              1749
                                                         1755
                                                                     1756
                                                                               1757
                                                                                               1762
+PN2404
                                           1754
                                                                                                           1763+PN2405
+PN2405
                  1764
                               1765
                                           1770
                                                         1771
                                                                     1772
                                                                                 1773
                                                                                               1778
                                                                                                            1779+PN2406
+PN2406
                  1780
                               1781
                                            1786
                                                         1787
                                                                     1788
                                                                                  1789
                                                                                               1794
                                                                                                            1795+PN2407
                               1797
+PN2407
                  1796
                                            1802
                                                         1803
                                                                     1804
                                                                                  1805
                                                                                               1810
                                                                                                            1811+PN2408
+PN2408
                  1812
                               1813
                                         1818
                                                         1819
                                                                     1820
                                                                               1821
                                                                                               1826
                                                                                                           1827+PN2409
+PN2409
                  1828
                               1829
                                           1834
                                                         1835
                                                                     1836
                                                                                  1837
                                                                                               1842
                                                                                                            1843+PN2410
+PN2410
                  1844
                               1845
                                            1850
                                                         1851
                                                                      1852
                                                                                  1853
                                                                                               1854
                                                                                                            1855+PN2411
                  1856
                               1857
                                           1862
                                                         1863
                                                                     1864
                                                                                1865
                                                                                               1870
                                                                                                           1871+PN2412
+PN2411
                  1872
                                                                                               1929
+PN2412
                               1873
                                            1878
                                                         1879
                                                                     1880
                                                                                  1881
                                                                                                            1930+PN2413
                  1931
+PN2413
                               1933
$ DESVAR for Patch 14
\$...1.. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
                  14 3 3
1810 1812 1813
+DE2401
                                                                                                                  +DE2402
                  1738 1740
+DE2402
                                            1741
                                                                                                                  +DE2403
                  1818 1820 18
15 115
+DE2403
                  1818
                                            1821
PATCH 15
                                                                               1
$ PANLST2 for Patch 15
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                                          45 46 47 48 49 55+PN2501
PANLST2
               15
                                 57
                     56
                                                                       85
                                                                                    86
+PN2501
                                              58
                                                           59
                                                                                                 87
                                                                                                              88+PN2502
+PN2502
                    89
                                 95
                                              96
                                                           97
                                                                       98
                                                                                    99
                                                                                                105
                                                                                                             106+PN2503
                                                                  116
                   107
+PN2503
                                108
                                             109
                                                          115
                                                                                    117
                                                                                                118
                                                                                                             119+PN2504
                                                                                              136
                                                                                                           137+PN2505
+PN2504
                   125
                                126
                                           127
                                                          128
                                                                  129
                                                                                    135
+PN2505
                    138
                                139
                                             145
                                                          146
                                                                       147
                                                                                    148
                                                                                                149
                                                                                                           155+PN2506
                    156
                                 157
                                             158
                                                          159
                                                                       165
                                                                                    166
                                                                                                167
+PN2506
                                                                                                             168+PN2507
                                                          177
                                                                                                185
+PN2507
                   169
                                175
                                             176
                                                                       178
                                                                                    179
                                                                                                            186+PN2508
+PN2508
                  187
                                 188
                                             189
                                                          195
                                                                       196
                                                                                   197
                                                                                                198
                                                                                                           199
$ DESVAR for Patch 15
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR
               15 3
                                             3
+DE2501
                     55
                                  57
                                               59
                                                                                                                  +DE2502
                   195
                                 197
                                             199
+DE2502
                                                                                                                  +DE2503
+DE2503
                  125
                                127
                                             129
Ś
                  16 116
PATCH 16
                                                                               1
$ PANLST2 for Patch 16
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                        41 42 43 44 51 52+PN2601
81 82 83 84 91 92+PN2602
PANIST2
               16
                                 54
+PN2601
                    53
                                                                      103
123
+PN2602
                    93
                                94
                                             101
                                                         102
                                                                                   104
                                                                                                111
                                                                                                             112+PN2603
+PN2603
                   113
                                114
                                             121
                                                          122
                                                                                    124
                                                                                                131
                                                                                                             132+PN2604
+PN2604
                   133
                            134
                                           141
                                                          142
                                                                      143
                                                                                    144
                                                                                              151
                                                                                                           152+PN2605
                                154
+PN2605
                    153
                                             161
                                                          162
                                                                       163
                                                                                    164
                                                                                              171
                                                                                                           172+PN2606
                    173
                                 174
                                                          182
                                                                                    184
                                                                                                191
+PN2606
                                             181
                                                                       183
                                                                                                             192+PN2607
+PN2607
                    193
                                194
                                             309
                                                          310
                                                                       311
                                                                                    312
                                                                                                313
                                                                                                             314+PN2608
+PN2608
                   315
                                             317
                                                        329
                                                                       341 353
                                                                                            389
                               316
$ DESVAR for Patch 16
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR
               16 3 3
                                 52
                                              54
                    389
+DE2601
                                                                                                                  +DE2602
                    309
                                 192
                                             194
+DE2602
                                                                                                                  +DE2603
                    316
                                122
                                            124
+DE2603
PATCH 17
                     17 117
                                                                               1
$ PANLST2 for Patch 17
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                  17
                                             269
                                                          270 271
PANLST2
                                                                                    272 273
                                                                                                             274+PN2701
                    275
                                 276
                                              277
                                                           278
                                                                       279
                                                                                    280
                                                                                                 281
+PN2701
                                                                                                             282+PN2702
                    283
                                 284
                                              285
                                                          286
                                                                       287
                                                                                    288
                                                                                                289
                                                                                                             290+PN2703
+PN2702
                    291
                                 292
                                              293
                                                          294
                                                                       295
                                                                                    296
                                                                                                297
+PN2703
                                                                                                             298+PN2704
                    299
                                 300
                                             301
                                                          302
                                                                                    304
                                                                                                305
+PN2704
                                                                       303
                                                                                                             306+PN2705
+PN2705
                    307
                                 308
                                             318
                                                          319
                                                                       320
                                                                                    321
                                                                                                322
                                                                                                             330+PN2706
+PN2706
                  331
                                332
                                             333
                                                          334
                                                                       342
                                                                                    343
                                                                                                344
                                                                                                            345+PN2707
```

```
+PN2707
          346
                 354
                           355
                                   356
                                          357
                                                  358
                                                          390
                                                               391+PN2708
+PN2708
            392
                   393
                           394
                                   402
                                           403
                                                  404
                                                          405
                                                                 406
$ DESVAR for Patch 17
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR
                        3
             17
                    3
            394
                    392
                           390
                                                                    +DE2702
+DE2701
+DE2702
            269
                    285
                           301
                                                                     +DE2703
+DE2703
            276
                    292
                           308
PATCH 18
              18
                      118
$ PANLST2 for Patch 18
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
           18
                           229
                                   230 231
                                                  232 233
            235
                           237
                                   238
                                           239
                                                  240
                                                          241
+PN2801
                   236
                                                                  242+PN2802
+PN2802
            243
                    244
                           245
                                   246
                                           247
                                                  248
                                                          249
                                                                  250+PN2803
                                   254
                                                  256
                                                          257
+PN2803
            251
                   252
                           253
                                           255
                                                                  258+PN2804
+PN2804
            259
                   260
                           261
                                   262
                                           263
                                                  264
                                                          265
                                                                  266+PN2805
+PN2805
            267
                   268
                           323
                                   324
                                           325
                                                  326
                                                          327
                                                                  335+PN2806
+PN2806
            336
                   337
                           338
                                   339
                                           347
                                                  348
                                                          349
                                                                 350+PN2807
            351
                   359
                                                          395
                           360
                                   361
                                           362
                                                  363
                                                                 396+PN2808
           397
                   398
                           399
                                   407
                                          408
                                                  409
                                                          410
+PN2808
                                                                 411
$ DESVAR for Patch 18
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
DESVAR
         18 3 3
+DE2801
            399
                   397
                           395
+DE2802
            229
                    245
                           261
                                                                    +DE2803
            236
+DE2803
                           268
            19
                    119
PATCH 19
                                               1
$ PANLST2 for Patch 19
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
         19
PANLST2
                           221 222 223 224 225 226+PN2901
            227
                    228
                                                  364
+PN2901
                           328
                                   340
                                           352
                                                          400
                                                                  412+PN2902
            461
                   462
                           463
                                   464
                                           465
                                                  466
                                                          467
                   470
                                                          475
                                   472
                                                  474
+PN2903
           469
                           471
                                          473
                                                                 476+PN2904
+PN2904
            477
                   478
                           479
                                   480
                                           481
                                                  482
                                                          483
                                                                 484+PN2905
            485
                           487
                                   488
                                                  490
+PN2905
                   486
                                           489
                                                          491
                                                                  492+PN2906
+PN2906
            493
                   494
                           495
                                   496
                                           497
                                                  498
                                                          499
                                                                  500+PN2907
+PN2907
            501
                   502
                           503
                                   504
                                           505
                                                  506
                                                          507
                                                                 508+PN2908
+PN2908
           509
                   510
                           513
                                   514
                                          517
                                                  518
                                                          521
                                                                 522
$ DESVAR for Patch 19
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
         19
DESVAR
                                                                    +DE2902
+DE2901
           522
                   514
                           400
+DE2902
            461
                   477
                           221
                                                                    +DE2903
           468
+DE2903
                   484
                           228
           20 120
PATCH 20
                                               1
$ PANLST2 for Patch 20
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                           557 558 559
        20
                                                  560 561
+PN3001
            563
                   564
                           565
                                   566
                                           567
                                                  568
                                                          569
                                                                  570+PN3002
+PN3002
            571
                   572
                           573
                                   574
                                          575
                                                  576
                                                          577
                                                                 578+PN3003
+PN3003
            579
                   580
                           581
                                   582
                                           583
                                                  584
                                                          585
                                                                 586+PN3004
            587
                           589
                                   590
                                                  592
                                                          593
+PN3004
                   588
                                           591
                                                                 594+PN3005
            595
                   596
                           597
                                   598
                                           599
                                                  600
                                                          601
+PN3005
                                                                  602+PN3006
                                   606
+PN3006
            603
                   604
                           605
                                          607
                                                  608
                                                          609
                                                                 610+PN3007
+PN3007
            611
                    612
$ DESVAR for Patch 20
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
DESVAR
            20 3 3
            609
+DE3001
                    611
                           612
+DE3002
            557
                   573
                           581
                                                                    +DE3003
+DE3003
            564
                           588
            21
                      121
PATCH 21
                                               1
$ PANLST2 for Patch 21
```

```
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2
             21
                             717
                                     718
                                             719
                                                     720
                                                              721
                                                                      722+PN3101
+PN3101
             723
                     724
                             725
                                     726
                                             727
                                                      728
                                                              729
                                                                      730+PN3102
             731
                     732
                                                      736
                                                              737
+PN3102
                             733
                                     734
                                             735
                                                                      738+PN3103
+PN3103
             739
                     740
                             741
                                     742
                                             743
                                                      744
                                                             745
                                                                      746+PN3104
+PN3104
             747
                     748
                             749
                                     750
                                             751
                                                      752
                                                              753
                                                                      754+PN3105
             755
                     756
                             757
                                     758
                                                     760
                                                                      762+PN3106
+PN3105
                                             759
                                                              761
             763
+PN3106
                     764
                             938
                                     939
                                             940
                                                      941
                                                              945
                                                                      946+PN3107
+PN3107
             947
                     948
                             952
                                     953
                                             954
                                                     955
                                                             959
                                                                      960+PN3108
+PN3108
             961
                     962
                            1205
                                    1206
                                            1207
                                                    1208
                                                             1212
                                                                     1213+PN3109
            1214
                            1219
                                    1220
                                            1221
                                                                     1227+PN3110
+PN3109
                    1215
                                                    1222
                                                            1226
+PN3110
            1228
                    1229
                            1233
                                    1234
                                            1235
                                                    1236
                                                             1240
                                                                     1241+PN3111
+PN3111
            1242
                    1243
                            1247
                                    1248
                                            1249
                                                    1250
                                                             1254
                                                                     1255+PN3112
            1256
+PN3112
                    1257
$ DESVAR for Patch 21
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                                                         +DE3101
DESVAR
            21
                     938
+DE3101
             941
                             717
                                                                         +DE3102
+DE3102
            1254
                    1257
                             757
                                                                         +DE3103
+DE3103
            1205
                    1208
                             764
                22
                       122
PATCH 22
                                                   1
Ś
$ PANLST2 for Patch 22
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                           942
                                  943 944 949
                                                            950
PANLST2
            2.2
                                                                     951+PN3201
+PN3201
            956
                     957
                             958
                                     963
                                             964
                                                     965
                                                             1202
                                                                     1203+PN3202
+PN3202
            1204
                    1209
                            1210
                                    1211
                                            1216
                                                    1217
                                                             1218
                                                                     1223+PN3203
            1224
                    1225
                            1230
                                    1231
                                            1232
                                                    1237
                                                             1238
                                                                     1239+PN3204
+PN3203
            1244
                    1245
                            1246
                                    1251
                                            1252
                                                    1253
                                                             1590
+PN3204
                                                                     1591+PN3205
            1598
                    1599
                                    1607
                                                             1622
+PN3205
                            1606
                                            1614
                                                    1615
                                                                     1623+PN3206
+PN3206
            1630
                   1631
                            1638
                                    1639
                                            1646
                                                    1647
                                                             1654
                                                                     1655+PN3207
+PN3207
           1662
                    1663
                            1670
                                    1671
                                            1678
                                                    1679
$ DESVAR for Patch 22
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
DESVAR
            2.2
                     3
                             3
                                                                         +DE3201
+DE3201
            1591
                     944
                             942
                                                                         +DE3202
                    1251
                            1253
+DE3202
            1623
                                                                         +DE3203
+DE3203
            1679
                    1202
                            1204
Ś
PATCH 23
                 23
                         123
                                                   1
$ PANLST2 for Patch 23
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
            23
                           1592 1593 1594 1595 1596 1597+PN3301
PANIST2
+PN3301
            1600
                   1601
                            1602
                                    1603
                                            1604
                                                   1605
                                                            1608
                                                                     1609+PN3302
            1610
                   1611
                            1612
                                    1613
                                            1616
                                                    1617
                                                            1618
                                                                     1619+PN3303
+PN3302
+PN3303
            1620
                    1621
                            1624
                                    1625
                                            1626
                                                    1627
                                                             1628
                                                                     1629+PN3304
+PN3304
            1632
                    1633
                            1634
                                    1635
                                            1636
                                                    1637
                                                             1640
                                                                     1641+PN3305
+PN3305
            1642
                    1643
                            1644
                                    1645
                                            1648
                                                    1649
                                                             1650
                                                                     1651+PN3306
+PN3306
            1652
                    1653
                            1656
                                    1657
                                            1658
                                                    1659
                                                             1660
                                                                     1661+PN3307
                                    1667
+PN3307
            1664
                    1665
                            1666
                                            1668
                                                    1669
                                                             1672
                                                                     1673+PN3308
            1674
                   1675
                            1676
                                    1677
                                            1680
                                                    1681
                                                             1682
                                                                     1683+PN3309
+PN3308
           1684
                    1685
+PN3309
$ DESVAR for Patch 23
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR
            23
                     3
                              3
                                                                         +DE3301
            1597
                    1594
                            1592
+DE3301
            1629
                    1626
                            1624
+DE3302
                                                                         +DE3303
+DE3303
            1685
                    1683
                            1680
PATCH 24
                       124
                                                   1
$ PANLST2 for Patch 24
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2
             24
                             795
                                   796
                                             797
                                                     798
                                                             799
                                                                      800+PN3401
             801
                     802
                                     804
                                             805
                                                      806
                                                              807
+PN3401
                             803
                                                                      808+PN3402
+PN3402
             809
                             811
                                     812
                                                      814
                                                              815
                                                                      816+PN3403
+PN3403
             817
                     818
                             819
                                     820
                                             821
                                                      822
                                                              823
                                                                      824+PN3404
+PN3404
             825
                     826
                             827
                                     828
                                             829
                                                      830
                                                              831
                                                                      832+PN3405
             833
                             875
                                     876
                                             877
                                                      878
                                                              882
                                                                      883+PN3406
+PN3405
                     834
```

```
+PN3406
                  884
                               885
                                               889
                                                          890
                                                                          891
                                                                                      892
                                                                                                896
                                                                                                             897+PN3407
                    898
                                  899
                                               903
                                                            904
                                                                         905
                                                                                      906
                                                                                                    910
+PN3407
                                                                                                                 911+PN3408
                    912
                                  913
                                               917
                                                            918
                                                                          919
                                                                                       920
                                                                                                    924
                                                                                                                  925+PN3409
+PN3408
                                               931
                                                                          933
                                                                                       934
+PN3409
                    926
                                  927
                                                            932
                                                                                                   1309
                                                                                                                1310+PN3410
+PN3410
                   1311
                                1312
                                              1316
                                                           1317
                                                                        1318
                                                                                     1319
                                                                                                   1323
                                                                                                                1324+PN3411
+PN3411
                   1325
                                1326
                                              1330
                                                           1331
                                                                        1332
                                                                                     1333
                                                                                                   1337
                                                                                                                1338+PN3412
+PN3412
                   1339
                                1340
                                              1344
                                                           1345
                                                                        1346
                                                                                     1347
$ DESVAR for Patch 24
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR
                    834
                                  824
                                               804
+DE3401
                                                                                                                      +DE3402
+DE3402
                    827
                                  817
                                               797
                                                                                                                      +DE3403
                   1347
                                1346
+DE3403
                                              1344
$
PATCH 25
                   25
                                     125
                                                                                  1
$ PANLST2 for Patch 25
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                                         766 767
PANLST2
                                               765
                                                                                       768
                                                                                                    769
                                                                                                                 770+PN3501
                     25
                                  772
                                                                                       776
+PN3501
                     771
                                               773
                                                             774
                                                                          775
                                                                                                    777
                                                                                                                  778+PN3502
                    779
                                  780
+PN3502
                                               781
                                                             782
                                                                          783
                                                                                       784
                                                                                                    785
                                                                                                                  786+PN3503
                    787
                                                                                       792
                                  788
                                               789
                                                            790
                                                                         791
                                                                                                    793
+PN3503
                                                                                                                 794+PN3504
+PN3504
                    879
                                  880
                                               881
                                                             886
                                                                          887
                                                                                       888
                                                                                                    893
                                                                                                                  894+PN3505
                    895
                                 900
                                                            902
                                                                         907
                                                                                       908
                                                                                                    909
+PN3505
                                               901
                                                                                                                 914+PN3506
+PN3506
                    915
                                 916
                                               921
                                                           922
                                                                         923
                                                                                      928
                                                                                                    929
                                                                                                                 930+PN3507
+PN3507
                    935
                                 936
                                               937
                                                           1306
                                                                        1307
                                                                                     1308
                                                                                                  1313
                                                                                                                1314+PN3508
+PN3508
                   1315
                                1320
                                              1321
                                                           1322
                                                                        1327
                                                                                     1328
                                                                                                   1329
                                                                                                                1334+PN3509
                 1335 1336
+PN3509
                                             1341
                                                          1342
                                                                     1343
$ DESVAR for Patch 25
\$...1.. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
                25
                                                                                                                      +DE3501
DESVAR
                                  784
+DE3501
                    794
                                               774
                                                                                                                       +DE3502
+DE3502
                     787
                                  777
                                               767
                                                                                                                      +DE3503
                   1343 1342 1341
+DE3503
                   26 126
PATCH 26
$ PANLST2 for Patch 26
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
             26
                                       1394 1395 1396 1397 1402 1403+PN3601
                   1404
                                1405
                                                                        1412
                                                                                    1413
+PN3601
                                             1410
                                                           1411
                                                                                                   1418
                                                                                                               1419+PN3602
+PN3602
                   1420
                                1421
                                              1426
                                                           1427
                                                                        1428
                                                                                     1429
                                                                                                   1434
                                                                                                                1435+PN3603
+PN3603
                   1436
                              1437
                                             1442
                                                           1443
                                                                        1444
                                                                                  1445
                                                                                                   1450
                                                                                                              1451+PN3604
                                                                                  1461
                   1452
                                1453
                                                           1459
                                                                                                   1466
+PN3604
                                           1458
                                                                        1460
                                                                                                                1467+PN3605
                                                           1471
+PN3605
                   1468
                                1469
                                              1470
                                                                        1472
                                                                                     1473
                                                                                                   1478
                                                                                                                1479+PN3606
                                                                                  1489
                   1480
                                1481
                                             1486
                                                           1487
                                                                        1488
                                                                                                   1494
+PN3606
                                                                                                                1495+PN3607
+PN3607
                  1496
                               1497
                                             1502
                                                           1503
                                                                        1504
                                                                                  1505
                                                                                                  1510
                                                                                                               1511+PN3608
+PN3608
                   1512
                                1513
                                             1518
                                                           1519
                                                                        1520
                                                                                     1521
                                                                                                  1526
                                                                                                                1527+PN3609
+PN3609
                   1528
                                1529
                                              1534
                                                           1535
                                                                        1536
                                                                                     1537
                                                                                                   1542
                                                                                                                1543+PN3610
+PN3610
                   1544
                                1545
                                             1550
                                                           1551
                                                                        1552
                                                                                    1553
                                                                                                  1558
                                                                                                                1559+PN3611
+PN3611
                   1560
                                1561
                                              1566
                                                           1567
                                                                        1568
                                                                                     1569
                                                                                                   1574
                                                                                                                1575+PN3612
+PN3612
                   1576
                                1577
                                              1582
                                                           1583
                                                                        1584
                                                                                     1585
                                                                                                   1918
                                                                                                                1919+PN3613
+PN3613
                   1920
                                1921
$ DESVAR for Patch 26
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                   26 3
                   1397
                                1396
                                              1394
+DE3601
                                                                                                                      +DE3602
                   1453
+DE3602
                                1452
                                             1450
                                                                                                                       +DE3603
                   1470
                                1471 1472
+DE3603
                                      127
PATCH 27
                                                                                  1
$ PANLST2 for Patch 27
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                   27
PANLST2
                                           1390
                                                          1391 1392 1393 1398 1399+PN3701
+PN3701
                   1400
                                1401
                                              1406
                                                           1407
                                                                        1408
                                                                                     1409
                                                                                                   1414
                                                                                                                1415+PN3702
                   1416
+PN3702
                                1417
                                              1422
                                                           1423
                                                                        1424
                                                                                     1425
                                                                                                   1430
                                                                                                                1431+PN3703
+PN3703
                   1432
                                1433
                                              1438
                                                           1439
                                                                        1440
                                                                                     1441
                                                                                                   1446
                                                                                                                1447+PN3704
+PN3704
                   1448
                                1449
                                              1454
                                                           1455
                                                                        1456
                                                                                     1457
                                                                                                   1462
                                                                                                                1463+PN3705
+PN3705
                   1464
                                1465
                                              1474
                                                           1475
                                                                        1476
                                                                                     1477
                                                                                                   1482
                                                                                                                1483+PN3706
+PN3706
                                             1490
                                                          1491
                                                                                     1493
                                                                                                  1498
                                                                                                               1499+PN3707
                  1484
                                1485
                                                                        1492
```

```
+PN3707
              1500 1501 1506
                                                           1507
                                                                      1508 1509 1514
                                                                                                              1515+PN3708
                                          1522
                                                                                                              1531+PN3709
+PN3708
              1516 1517
                                                           1523 1524 1525
                                                                                                    1530
+PN3709
                   1532
                                1533
                                              1538
                                                            1539
                                                                         1540
                                                                                      1541
                                                                                                    1546
                                                                                                                 1547+PN3710
                              1549
                   1548
                                                           1555
                                                                        1556
                                                                                  1557
+PN3710
                                             1554
                                                                                                    1562
                                                                                                                 1563+PN3711
+PN3711
                   1564
                                1565
                                             1570
                                                           1571
                                                                         1572 1573
                                                                                                    1578
                                                                                                                 1579+PN3712
+PN3712
                   1580
                                 1581
                                              1586
                                                           1587
                                                                         1588
                                                                                     1589
                                                                                                    1922
                                                                                                                 1923+PN3713
                 1924
                               1932
+PN3713
$ DESVAR for Patch 27
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
DESVAR
+DE3701
                   1393
                                1392
                                              1390
                                                                                                                        +DE3702
                   1449
                                1448
+DE3702
                                              1446
                                                                                                                        +DE3703
                             1475
                                           1477
                 1474
+DE3703
$
PATCH 28
                                       128
                         2.8
$ PANLST2 for Patch 28
\$ \dots 1 \dots | \dots 2 \dots | \dots 3 \dots | \dots 4 \dots | \dots 5 \dots | \dots 6 \dots | \dots 7 \dots | \dots 8 \dots | \dots 9 \dots | \dots 10 \dots |
             28 1882 1883 1884 1885 1874 1875 CONT
1876 1877 1866 1867 1868 1869 1858 1859 CONT
PANLST2
                  1860 1861
CONT
$ DESVAR for Patch 28
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                   28 2
+DE3701
                   1882
                                1885
                              1877
                 1874
+DE3702
                                                                                                                        +DE3703
                              1869
1861
+DE3703
                   1866
                                                                                                                        +CONT
                 1858
+CONT
$ HOT PANELS for Patch 2
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                                8 6 69 20 18 66 CONT
PANLST2 102
CONT
                    32
                                    30
                                                 63
                                                           413
                                                                         437
                                                                                        377
$ PANLST2 of DESVAR for Patch 4
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                                                          416 414 442 440 438+PA1403
PANLST2 104
                                              418
+PA1403
                     382
                                                378
$ PANLST2 of DESVAR for Patch 5
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                105
                                                         421 419 447 445 443+PA1503
                                            423
PANLST2
                    387
$ PANLST2 of DESVAR for Patch 6
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
            106
523 515
PANTIST2
                                      1949 1951 424 1941 1943 448+PA1603
+PA1603
                    523
                                              388
$ PANLST2 of DESVAR for Patch 7
\$...1.. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
                                                         635 636 625 627 628+PA1703
                                        633
                                  615
+PA1703
                    613
                                                616
$ PANLST2 of DESVAR for Patch 8
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                           1195
PANLST2 108
                                                         1198 1201 1180 1184 1187+PA1803
                   1174
+PA1803
                              1177
                                           1181
$ PANLST2 of DESVAR for Patch 9
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANLST2 109
                                                          1914 1917 1894 1898 1901+PA1903
                                             1910
+PA1903
                   1886
                                1890
                                              1893
$ PANLST2 of DESVAR for Patch 10
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                                                        1291 1292 1293 1017 1018 CONT
1038 1039 1040 677 678 CONT
PANLST2
                  110
                                            1290
                   1019
                                 1020
                                              1037
CONT
                   679
                                680
Ś
$ PANLST2 of DESVAR for Patch 11
```

```
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANLST2 111
                                 1385 1386 1107 1087 1077+PA2103
                         1383
+PA2103
           1141
                  1131
                          1126
$ PANLST2 of DESVAR for Patch 12
$..1.|..2..|..3..|..4..|..5..|..6..|..7..|..8..|..9..|..10..|
PANLST2 112 1387 1388 1389 1067 1057 1047+PA2203
           1121
$ PANLST2 of DESVAR for Patch 13
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
       113
                        1806 1808 1809 1734 1736 1737+PA2303
PANLST2
           1814
                  1816
+PA2303
                          1817
$ PANLST2 of DESVAR for Patch 14
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                          1810
                                1812 1813 1738 1740 1741+PA2403
           1818
                  1820
+PA2403
                         1821
Ś
$ PANLST2 of DESVAR for Patch 15
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                         55
                                57 59 195 197 199+PA2503
+PA2503
           125
                   127
                           129
$ PANLST2 of DESVAR for Patch 16
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2 116
+PA2603 316
                                52 54 309 192 194+PA2603
                          389
                   122
                           124
$ PANLST2 of DESVAR for Patch 17
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                          394 392 390 269 285 301+PA2703
PANLST2 117
+PA2703
           276
                    292
                           308
$ PANLST2 of DESVAR for Patch 18
$..1.|..2..|..3..|..4..|..5...|..6...|..7...|..8...|..9...|..10..|
PANLST2 118 399 397 395 229 245 261+PA2803
+PA2803
            236
                           268
$ PANLST2 of DESVAR for Patch 19
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
         119
PANLST2
                         522
                                514 400 461 477 221+PA2903
           468
$ PANLST2 of DESVAR for Patch 20
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANTIST2
       120
                       609 611 612 557 573 581+PA3003
+PA3003
           564
                  580
                           588
$ PANLST2 of DESVAR for Patch 21
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
        121
                                938 717 1254 1257 757+PA3103
                         941
           1205
                  1208
+PA3103
                           764
$ PANLST2 of DESVAR for Patch 22
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                 944 942 1623 1251 1253+PA3203
PANLST2 122
                         1591
+PA3203
          1679
                  1202
                        1204
$ PANLST2 of DESVAR for Patch 23
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2 123
                                 1594 1592 1629 1626 1624+PA3303
                          1597
+PA3303
           1685
                  1683
                          1680
$ PANLST2 of DESVAR for Patch 24
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANLST2 124 834 824 804 827 817 797+PA3403
           1347
                  1346
$ PANLST2 of DESVAR for Patch 25
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
```

```
PANLST2
                   125
                                                794
                                                              784 774
                                                                                              787
                                                                                                            777 767+PA3503
+PA3503 1343 1342 1341
$ PANLST2 of DESVAR for Patch 26
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
                                                1397
                                                              1396 1394 1453 1452
+PA3603
                     1470
                                 1471
                                                 1472
$ PANLST2 of DESVAR for Patch 27
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
PANLST2 127 1393 1392 1390 1449 1448 1446+PA3703
                                  1475
+PA3703
                     1474
$ PANLST2 of DESVAR for Patch 28
\$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
PANLST2 128
                                                1882 1885 1874 1877 1866
CONT
                     1858
                                   1861
$ PANLST2 of DESVAR for Patch 29
\$...1.. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
               129
                                                            1272 1271 1270 840 850 CONT
PANLST2
                                                1273
CONT
                      860
                                     870
                                                  835
                                                                845
                                                                               855
                                                                                             865
                                                                                                            697
                                                                                                                          698 CONT
                     699 700
$ PANLST2 of HOT PANELS for Patch 30 (VERTICAL WING)
$ ...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10...|
                                     10210 10201 10196 10105 10096 10091 CONT
                  130
CONT 10015 10006 10001
                                PANEL LIST PART
$TRJLST SETID
TRJLST 1
                                                                                                                                 CONT
CONT
STRAJCT TRAJID
$ TIME
                           MACH ALTH AOA BETA FORM FILE1 FILE1
$...1..|...2...|...3...|...4...|...5...|...6...|...7...|...8...|...9...|...10..|
TRAJCT
              1
                                                                                                                                 CONT
                     0.0 26.8004800000.
                                                             10.0
                                                                                   TECPLOT CPTEMP1.PLT
CONT
                     30.0 26.9004572000.
                                                                30.0
                                                                                                                                 CONT
CONT
                     70.0 26.9004260000.
                                                                30.0
                                                                                                                                 CONT
                  110.0 26.9003948000.
                                                                                                                                 CONT
CONT
                                                                30.0
CONT
                 150.0 26.9003636000.
                                                                30.0
                                                                                                                                 CONT
CONT
                  190.0 26.6003336000.
230.0 25.6002748000.
                                                                30.0
                                                                                                                                 CONT
CONT
                                                                30.0
                                                                                                                                 CONT
                  270.0 24.9003012000.
                                                                30.0
CONT
                  310.0 24.7003108000.
                                                                                                                                 CONT
                                                                30.0
CONT
                   350.0 25.1003300000.
                                                                30.0
                                                                                                                                 CONT
                  390.0 25.4003492000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                  430.0 25.3003648000.
                                                                30.0
                                                                                                                                 CONT
                  470.0 25.3003756000.
510.0 25.2003792000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                  550.0 25.2003768000.
                                                                30.0
                                                                                                                                 CONT
                  590.0 25.2003672000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                   630.0 25.2003528000.
                                                                30.0
                                                                                                                                 CONT
                   670.0 24.8003324000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                  710.0 23.9003108000.
                                                                30.0
                                                                                                                                 CONT
                  750.0 23.1002952000.
790.0 22.5002940000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                  830.0 22.3003048000.
                                                                30.0
                                                                                                                                 CONT
                  870.0 22.4003168000.
CONT
                                                                30.0
                                                                                                                                 CONT
                   910.0 22.4003240000.
                                                                30.0
CONT
                                                                                                                                 CONT
                  950.0 22.2003228000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                 990.0 21.7003120000.
                                                                30.0
                                                                                     TECPLOT CPTEMP2.PLT
                 1030.0 21.0002964000.
1070.0 20.1002820000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                                                                30.0
                                                                                                                                 CONT
                1110.0 19.4002796000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                 1150.0 18.9002868000.
                                                                30.0
                                                                                                                                 CONT
                 1190.0 18.6002916000.
1230.0 18.2002904000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                                                                                                                                 CONT
                                                                30.0
                1270.0 17.5002808000.
                                                                30.0
                                                                                                                                 CONT
                1310.0 16.5002688000.
1350.0 15.5002616000.
CONT
                                                                30.0
                                                                                                                                 CONT
CONT
                                                                30.0
                                                                                                                                 CONT
              1390.0 14.8002628000.
CONT
                                                                30.0
                                                                                                                                 CONT
```

```
CONT
        1430.0 14.1002640000.
                                     30.0
                                                                          CONT
CONT
          1470.0 13.3002592000.
                                     30.0
                                                                          CONT
CONT
          1510.0 12.4002496000.
                                     30.0
                                                                          CONT
CONT
          1550.0 11.4002400000.
                                     30.0
                                                                          CONT
         1590.0 10.3002352000.
                                                                          CONT
CONT
                                     30.0
                                                 TECPLOT CPTEMP3.PLT
CONT
          1630.0
                   9.4002316000.
                                     30.0
                                                                          CONT
CONT
         1670.0
                  8.4802256000.
                                     30.0
                                                                          CONT
CONT
          1710.0
                   7.4902148000.
                                     30.0
                                                                          CONT
CONT
          1750.0
                                                                          CONT
                  6.4402040000.
                                     30.0
CONT
          1790.0
                   5.4701932000.
                                     30.0
                                                                          CONT
CONT
          1830.0
                   4.5501824000.
                                     30.0
                                                                          CONT
CONT
          1870.0
                   3.7101716000.
                                     30.0
                                                                          CONT
CONT
          1910.0
                   2.8901572000.
                                     30.0
                                                                          CONT
CONT
          1950.0
                   2.1401428000.
                                     30.0
$CONT
          1990.0
                   1.5001284000.
                                     30.0
                                                                           CONT
$CONT
           2030.0
                   1.060 91000.
                                      30.0
                                                                           CONT
$CONT
           2070.0
                    0.881 68100.
                                      30.0
                                                                           CONT
                    0.703 48900.
$CONT
           2110.0
                                      30.0
                                                                           CONT
                   0.493 38900.
                                                                           CONT
$CONT
           2150.0
                                      30.0
$CONT
           2190.0
                    0.404
                           29900.
                                      30.0
                                                                           CONT
                                      30.0
$CONT
           2230.0
                    0.339 21800.
                                                                           CONT
$CONT
           2270.0
                    0.292 14700.
                                      30.0
                                                                           CONT
                    0.257
                            8230.
$CONT
           2310.0
                                      30.0
                                                                           CONT
$CONT
           2350.0
                    0.230
                            2330.
                                      30.0
                                                                           CONT
$CONT
           2370.0
                    0.221
                                0.
                                      30.0
                                                  TECPLOT CPTEMP4.PLT
$
          1 0.0 190.0 310.0 470.0 630.0 1110.0 1270.0 1430.0 1590.0 1750.0 1950.0
TIMESP
                                                            790.0 950. CONT
CONT
$THERMPR | SETID | TEMP
                       |HOTWALL|TRANS |GAS
                                               EMMS
THERMPR 1
                 100F
ENDDATA
```

Listing 5.2 Control Table File: CFDTABLE.DAT

Micro-x model consists of body, wing and vertical wing MICROXGEO DAT REFC סססס REES REFX REFY REFZ NO AESURFZ LENGTH UNIT MASS UNIT 2.2000E+00 1.0000E+00 3.8000E+00 2.6000E+01 0.0000E+00 0.0000E+00 0 IN LBF/ ORATE RRATE CD CY CT. CB MACH AT.PHA BETA PRATE CM 2.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 7.9987E+02 2.4940E-02 -1.8397E+01 -1.0540E+00 2.6271E+04 5.9185E+00FLOW0001 5.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 7.0135E+02 -1.0868E-02 1.3357E+02 -4.1108E-01 -1.7130E+03 -1.6889E+00FL0W0002 8.0000E+00 0.0000E+00 1.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.463E+02 1.463E+02 1.4663E-01 -1.6545E+03 2.5563E+00FLOW0004 1.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1113E+02 -4.1814E-02 -1.4654E+03 1.1444E+00FLOW0005 1.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.1003E+02 -1.6831E-02 1.1003E+02 -6.2272E-01 -1.4239E+03 -1.3820E+00FLOW0006 1.4000E+01 0.0000E+00 1.5000E+01 0.0000E+00 1.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0779E+02 -6.8531E-01 -1.3243E+03 8.8840E+00FLOW0009 1.7000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0726E+02 -2.3464E-02 1.0726E+02 -6.8298E-01 -1.3045E+03 8.9478E-01FLOW0010 1.8000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.283E+03 -3.2834E+00FLow0011 1.9000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0644E+02 1.0644E+02 -8.2392E-02 -1.2760E+03 -3.5558E+00FLOW0012 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0610E+02 -1.6163E-02 1.0610E+02 -9.5029E-01 -1.2613E+03 -3.3039E+00FLOW0013 2.1000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.0581E+02 -9.5137E-03 1.0581E+02 -9.0870E-01 -1.2525E+03 7.5001E+00FLOW0014 2.2000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.053E+02 -1.053E+02 -1.0797E+00 -1.2429E+03 4.8779E+00FLOW0015 2.3000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2339E+03 8.2430E+00FL0W0016 2.4000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.4383E-03 1.0511E+02 -7.8896E-01 -1.2241E+03 1.3088E+01FLOW0017 2.5000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2757E-01 -1.2252E+03 -1.4377E+01FLOW0018 2.6000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 6.5907E+02 6.9294E-03 1.0479E+02 -6.2751E-01 -1.2162E+03 9.4547E+00FLOW0019 2.7000E+01 0.0000E+00 $2.0000E+00 \\ 0.0000E+00 \\ 1.0000E+01 \\ 0.0000E+01 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 1.1302E+03 \\ -5.3110E-02 \\ 1.8840E+03 \\ 2.6184E+00 \\ -1.7694E+05 \\ 2.4126E+01FLOW0021 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.0000E+00 \\ 0.000E+00 \\ 0.0000E+00 \\$ 5.0000E+00 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 9.8955E+02 1.0233E-03 1.1771E+03 -1.3776E+00 -1.0334E+05 -3.2820E+00FL0W0022 1.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.3275E+02 -2.7573E-02 9.3087E+02 1.7026E+00 -7.6650E+04 1.4705E+01FLOW0023 8.0000E+00 0.0000E+00 1.0000E+01 0.0000E+00 1.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.1579E+02 -1.8801E-02 8.6497E+02 -2.1790E+00 -6.9495E+04 -8.3944E+00FLOW0024 1.2000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.0716E+02 -3.0075E-02 8.2660E+02 6.5880E-01 -6.5357E+04 7.6306E+00FL0W0025 1.3000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.0388E+02 -4.6081E-02 8.1343E+02 1.4123E+00 -6.3929E+04 1.0514E+01FL0W0026 1.4000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 9.0126E+02 -3.4669E-02 8.0285E+02 -3.1132E-01 -6.2790E+04 7.1792E-01FLOW0027 1.5000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9921E+02 -2.0596E-02 7.9411E+02 -2.4779E+00 -6.1850E+04 -8.2591E+00FLOW0028 1.6000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9753E+02 -3.8426E-02 7.8695E+02 -3.2025E+00 -6.1077E+04 -1.1007E+01FLOW0029 1,7000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9606E+02 -5.0142E-02 7.8099E+02 -8.2283E-01 -6.0428E+04 -5.6778E-01FL0W0030 1.8000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9492E+02 -4.1506E-02 7.7594E+02 -3.0758E-01 -5.9886E+04 3.6475E+00FL0W0031 1.9000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9378E+02 -4.2402E-02 7.7170E+02 1.4419E-01 -5.9417E+04 4.5156E+00FL0W0032 2.0000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9328E+02 -1.4706E-02 7.6795E+02 -1.9454E-01 -5.9029E+04 2.2919E+00FLOW0033 2.1000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9236E+02 -3.8416E-02 7.6483E+02 -8.0568E-01 -5.8686E+04 -3.1053E+00FLOW0034 2.2000E+01 0.0000E+00 1.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9165E+02 3.5135E-05 7.6207E+02 -1.5491E+00 -5.8389E+04 -7.6918E+00FLOW0035 2.3000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9083E+02 -3.5267E-02 7.5975E+02 -3.0131E+00 -5.8117E+04 -1.2309E+01FLOW0036 2.4000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9034E+02 -3.6381E-02 7.5762E+02 -1.1169E+00 -5.7896E+04 -4.5978E+00FL0W0037 1.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.9012E+02 -3.0701E-02 7.5565E+02 -7.0691E-01 -5.7690E+04 -9.9133E-01FLOW0038 2.5000E+01 0.0000E+00 2.6000E+01 0.0000E+00 1.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.8955E+02 -8.5557E-03 7.5399E+02 -1.3854E-01 -5.7512E+04 -7.0207E-01FL0W0039 $2.7000{\pm}+01 \quad 0.0000{\pm}+00 \quad 1.0000{\pm}+01 \quad 0.0000{\pm}+01 \quad 0.0000{\pm}+00 \quad 0.00$ 2.0000E+00 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 2.3237E+03 -5.3518E-02 4.0260E+03 9.4471E+00 -4.1912E+05 2.6880E+01FL0W0041 5.0000E+00 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.9169E+03 -7.2632E-02 2.5728E+03 1.8532E+01 -2.6326E+05 5.1118E+01FLOW0042 8.0000E+00 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.7952E+03 -1.5172E-01 2.2460E+03 2.4724E+01 -2.2584E+05 6.9763E+01FL0W0043 1.0000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7638E+03 -1.5190E-01 2.1598E+03 2.2984E+01 -2.1580E+05 6.6612E+01FLOW0044 1.2000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.7468E+03 -6.7094E-02 2.1100E+03 2.0345E+01 -2.1010E+05 5.5507E+01FL0W0045 1.3000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7406E+03 -9.3756E-02 2.0937E+03 1.5848E+01 -2.0817E+05 4.4619E+01FL0W0046 1.4000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.7370E+03 -6.7049E-02 2.0802E+03 2.6660E+01 -2.0666E+05 6.6820E+01FLOW0047 1.5000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.7333E+03 -7.1051E-02 2.0694E+03 2.0563E+01 -2.0540E+05 5.5005E+01FLOW0048 1.6000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7303E+03 -6.9892E-02 2.0607E+03 1.3451E+01 -2.0438E+05 3.9020E+01FLOW0049 1.7000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.7276E+03 -6.2605E-02 2.0534E+03 1.7465E+01 -2.0351E+05 4.8107E+01FLOW0050 1.8000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.7265E+03 -5.8031E-02 2.0469E+03 2.7297E+01 -2.0280E+05 7.8672E+01FL0W0051 1.9000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7247E+03 -3.2628E-02 2.0418E+03 1.8489E+01 -2.0221E+05 5.0938E+01FLOW0052 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7240E+03 -4.3411E-02 2.0371E+03 1.6811E+01 -2.0172E+05 4.3563E+01FL0W0053 2.0000E+01 0.0000E+00 2.1000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 1.7220E+03 -5.4399E-02 2.0337E+03 2.5187E+01 -2.0129E+05 7.2112E+01FLOW0054 2.2000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7211E+03 -1.7178E-02 2.0305E+03 1.6912E+01 -2.0091E+05 4.7533E+01FL0W0055 2.3000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7198E+03 -4.8520E-02 2.0277E+03 1.9717E+01 -2.0058E+05 5.2020E+01FLOW0056 2.4000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7194E+03 -1.4288E-02 2.0250E+03 1.9532E+01 -2.0029E+05 5.4093E+01FLOW0057 2.5000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7188E+03 -7.9614E-02 2.0227E+03 2.5834E+01 -2.0003E+05 7.0329E+01FLOW0058 2.6000E+01 0.0000E+00 2.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7175E+03 -2.2476E-02 2.0208E+03 2.3507E+01 -1.9978E+05 6.1725E+01FLOW0059 2.7000E+01 0.0000E+00 2.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.7179E+03 -3.9058E-02 2.0186E+03 1.2482E+01 -1.9959E+05 3.8667E+01FLOW0060 2.0000E+00 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 4.3270E+03 -4.5826E-02 5.7496E+03 3.8506E+01 -6.6062E+05 6.4239E+01FLOW0061

5.0000E+00 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.5528E+03 1.6714E-02 3.9715E+03 2.5802E+01 -4.6293E+05 4.4717E+01FL0W0062 8.0000E+00 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 3.4141E+03 -2.4570E-02 3.6795E+03 6.1014E+01 -4.3003E+05 1.0571E+02FLOW0063 1.0000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3798E+03 -1.9887E-03 3.6100E+03 6.4606E+01 -4.2225E+05 1.0649E+02FLOW0064 1.2000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3584E+03 2.5231E-02 3.5713E+03 4.8518E+01 -4.1765E+05 7.9896E+01FL0W0065 1.3000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3497E+03 6.2068E-02 3.5576E+03 3.7255E+01 -4.1587E+05 6.5100E+01FL0W0066 1.4000E+01 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3408E+03 5.5995E-02 3.5448E+03 4.4213E+01 -4.1409E+05 7.4399E+01FLOW0067 1.5000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3344E+03 2.6728E-02 3.5323E+03 4.0167E+01 -4.1241E+05 6.9410E+01FLOW0068 1.6000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3267E+03 3.2710E-02 3.5233E+03 3.4928E+01 -4.1097E+05 5.8694E+01FL0W0069 1.7000E+01 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3223E+03 1.0074E-01 3.5154E+03 5.6788E+01 -4.0995E+05 9.8485E+01FLOW0070 $1.8000{\text{E}} + 01 \\ 0.0000{\text{E}} + 00 \\ 3.0000{\text{E}} + 01 \\ 0.0000{\text{E}} + 01 \\ 0.00000{\text{E}} + 01 \\ 0.00000{\text{E}} + 01 \\ 0.00000{\text{E}} + 01 \\ 0.00000{\text{E}} + 01 \\ 0.000000000000000000$ 1.9000E+01 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3158E+03 3.8586E-02 3.5040E+03 4.5140E+01 -4.0849E+05 7.3626E+01FLOW0072 2.0000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3132E+03 5.3006E-02 3.5001E+03 3.4775E+01 -4.0797E+05 5.6040E+01FL0W0073 2.1000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3122E+03 4.0929E-02 3.4959E+03 4.1413E+01 -4.0752E+05 7.1934E+01FL0W0074 2.2000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 3.3097E+03 1.1559E-02 3.4931E+03 3.9542E+01 -4.0710E+05 6.8340E+01FL0W0075 2.3000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+01 0.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 3.3079E+03 4.8312E-02 3.4903E+03 5.6794E+01 -4.0670E+05 9.3945E+01FL0W0076 2.4000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+01 0.0000E+01 0.0000E+01 0.0000E+01 0.0000E+01 3.3068E+03 3.9368E-02 3.4876E+03 4.0710E+01 -4.0640E+05 6.9294E+01FL0W0077 2.5000E+01 0.0000E+00 3.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3063E+03 6.2402E-02 3.4848E+03 4.3829E+01 -4.0614E+05 7.3055E+01FLOW0078 2.6000E+01 0.0000E+00 3.0000E+01 0.0000E+01 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 3.3041E+03 6.0713E-02 3.4837E+03 3.7603E+01 -4.0586E+05 5.8154E+01FL0W0079 $2.7000{\pm}+01 \quad 0.0000{\pm}+00 \quad 3.0000{\pm}+01 \quad 0.0000{\pm}+01 \quad 0.0000{\pm}+01 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 0.0000{\pm}+00 \quad 3.3033{\pm}+03 \quad 8.4541{\pm}-02 \quad 3.4818{\pm}+03 \quad 5.2618{\pm}+01 \quad -4.0565{\pm}+05 \quad 9.1047{\pm}+015L0W0080$

Listing 5.3 ZONAIR Solution File: FLOWi

```
(Only SHOWS a part of the file:FLOW0001)
                                          1UVWCP
                2102
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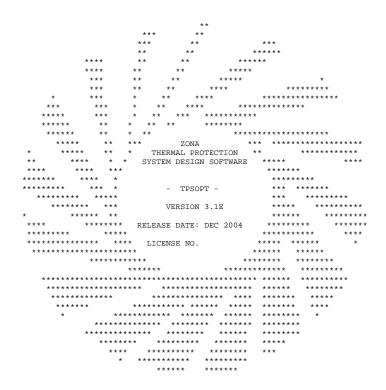
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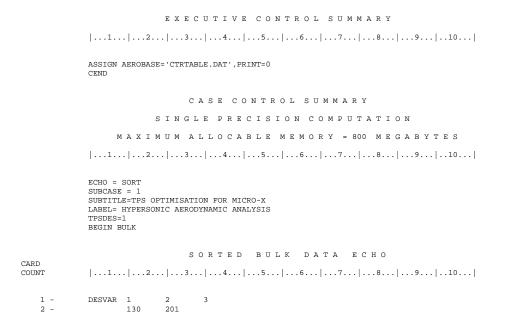
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9.871166945E-01 9.897794127E-01 1.005447745E+00
                                                  1.007267833E+00
                                                                  1.008570433E+00
1.008573890E+00 1.007089734E+00 1.005214334E+00 1.002960801E+00 1.003262997E+00
1.008807898E+00 1.009069920E+00 1.009649873E+00
                                                 1.010323524E+00
                                                                  1.009912848E+00
1.009276390E+00 1.008605361E+00 1.004135489E+00 1.012917757E+00 1.012503743E+00
1.012285590E+00
                1.010968566E+00 1.011114001E+00 1.011071563E+00 1.010847330E+00
1.058315873E+00 1.019522429E+00 1.019108772E+00 1.019749761E+00
                                                                  1.018193841E+00
1.018383861E+00 1.018690705E+00 1.018109322E+00 1.045373321E+00 1.019199252E+00
1.019855261E+00 1.019537210E+00 1.019023538E+00 1.018458009E+00 1.018172383E+00
1 018618464E+00 1 016155362E+00 1 001734138E+00 9 965904951E-01 9 962066412E-01
9.975734353E-01 1.000180244E+00 1.002205014E+00 1.002673388E+00 9.998856783E-01
1.000120759E+00 9.959940910E-01 9.942358732E-01 9.946061373E-01 9.968177080E-01
9.963892698E-01 9.987709522E-01 9.998059869E-01 9.994566441E-01 9.968314171E-01
9.930342436E-01 9.914932251E-01 9.921708703E-01 9.939869046E-01 9.954401255E-01
9.994204044E-01 1.000447512E+00 9.985973835E-01 9.942225218E-01 9.915949702E-01
9.904123545E-01 9.902310967E-01 9.916859269E-01 9.962977171E-01 1.010408282E+00
1.008325934E+00 1.003032327E+00 9.992443919E-01 9.957760572E-01 9.913356900E-01
9.861409664E-01 9.743839502E-01 1.033594489E+00 1.030242920E+00 1.023961663E+00
1.018420696E+00 1.012780070E+00 1.006267309E+00 9.990444183E-01 9.908322096E-01
1.054497600E+00 1.047814012E+00 1.046084523E+00 1.040315986E+00 1.033833623E+00
 .026265264E+00 1.017892241E+00 1.005015016E+00 1.050654054E+00 1.054751635E+00
1.051947713E+00 1.048288941E+00 1.045998573E+00 1.042581916E+00 1.032233715E+00
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1.007503629E+00 1.002646089E+00 9.985366464E-01 9.887616634E-01 1.023985505E+00

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1.025180101E+00 9.900228977E-01 9.905315042E-01 9.909904003E-01 9.910537004E-01
9.911105037E-01 9.910841584E-01 9.900228977E-01 9.905315042E-01 9.909904003E-01
9 910537004E-01 9 911105037E-01 9 910841584E-01 9 621086121E-01 9 547176957E-01
9.529698491E-01 9.529951811E-01 9.677066803E-01 9.642311335E-01 9.657726288E-01
9.656545520E-01 9.733516574E-01 9.746221900E-01 9.753733873E-01 9.729104638E-01 9.757050872E-01 9.781599641E-01 9.802461267E-01 9.820924997E-01 8.939133286E-01
9.338871837E-01 9.470753074E-01 9.626667500E-01 9.759947062E-01 9.957512617E-01
1.004343987E+00 1.020272374E+00 1.025063872E+00 1.030619621E+00 1.034663200E+00
1.037121654E+00 1.038638592E+00 1.039679766E+00 1.040550113E+00 8.865965605E-01
9.387108088E-01 9.526506066E-01 9.654336572E-01 9.793950319E-01 9.956505299E-01
1.006496191E+00 1.019605517E+00 1.024944544E+00 1.029599190E+00 1.032925010E+00
1.034850001E+00 1.036020994E+00 1.036863804E+00 1.037609220E+00 8.925445080E-01
9.488989115E-01 9.570653439E-01 9.693323970E-01 9.837755561E-01 9.982656240E-01
 .010647058E+00 1.019605517E+00 1.027107000E+00 1.030871987E+00 1.033406615E+00
1.034619451E+00 1.035131812E+00 1.035367489E+00 1.035523415E+00 9.043428898E-01
9.567778707E-01 9.645742774E-01 9.734985828E-01 9.909817576E-01 1.002720356E+00
1.017070532E+00 1.022599459E+00 1.031764984E+00 1.034765363E+00 1.036574960E+00
1.037088990E+00 1.036877394E+00 1.036333680E+00 1.035557032E+00 9.156116247E-01
9.552410245E-01 9.738866091E-01 9.810441136E-01 9.996590614E-01 1.009549618E+00
1.024725676E+00 1.027940989E+00 1.038041353E+00 1.040513873E+00 1.041810751E+00
1.041821241E+00 1.041047215E+00 1.039817095E+00 1.037885189E+00 9.250282645E-01
9.644158483E-01 9.830436707E-01 9.901049137E-01 1.007971406E+00 1.017132759E+00
1.032036781E+00 1.037434101E+00 1.044556737E+00 1.046802163E+00 1.047900319E+00
1 047727466E+00 1 046688795E+00 1 045008063E+00 1 045624733E+00 9 337037206E-01
9.728511572E-01 9.916085601E-01 9.985174537E-01 1.015319943E+00 1.023983955E+00
1.038378835E+00 1.043642759E+00 1.050643563E+00 1.052893400E+00 1.054051280E+00
1.053984761E+00 1.052990675E+00 1.051144838E+00
                                                  1.051241517E+00 9.412385225E-01
9.802306890E-01 9.914758801E-01 1.005961418E+00
                                                  1.013412952E+00 1.029740810E+00
1.043737531E+00 1.049022079E+00 1.056221366E+00 1.058631420E+00 1.060009003E+00
1.060225010E+00 1.059507012E+00 1.057766080E+00
                                                  1.057571173E+00
                                                                   9.468733668E-01
9.858049750E-01 9.971848130E-01 1.011952043E+00 1.019089937E+00 1.034427762E+00
1.048128366E+00 1.053541183E+00 1.061200738E+00 1.063900113E+00 1.065612435E+00
1.066208243E+00 1.065896034E+00 1.064447284E+00 1.064155698E+00 9.506205320E-01
9.894208908E-01 1.000998378E+00 1.016542315E+00 1.023668051E+00 1.038393259E+00
1.045374513E+00 1.057332754E+00 1.065499902E+00
                                                  1.068545818E+00
1.071658015E+00 1.071750879E+00 1.070607781E+00 1.070239782E+00 9.531196952E-01 9.918963313E-01 1.003744483E+00 1.020401835E+00 1.027748823E+00 1.042165637E+00
1.048903227E+00 1.060709834E+00 1.069129705E+00 1.072420835E+00 1.074813128E+00
1.076100588E+00 1.076398492E+00 1.075315714E+00 1.074624062E+00 8.850626349E-01
9.945017695E-01 1.006414294E+00 1.015884042E+00 1.031584024E+00 1.045831323E+00
1.052308679E+00 1.063677788E+00 1.071814775E+00 1.074994326E+00 1.077265501E+00
1.078381419E+00 1.078401446E+00 1.076871753E+00 1.075399041E+00 8.904650211E-01
9.819126129E-01 1.008878589E+00 1.018564105E+00 1.034707308E+00 1.048711419E+00
1.054838181E+00
                1.065202355E+00 1.069028854E+00 1.074554205E+00
                                                                   1.076092362E+00
1.076417208E+00 1.075581908E+00 1.073109031E+00 1.070754170E+00 8.930106759E-01
9.838773608E-01 1.009599924E+00 1.019168615E+00 1.035101175E+00 1.048453569E+00
1.054068446E+00 1.063022971E+00 1.068216205E+00 1.069613576E+00 1.070097446E+00
1 069476485E+00 1 067933202E+00 1 065230370E+00 1 063017726E+00 9 981904030E-01
1.019168615E+00 1.027511120E+00 1.042101502E+00 1.048453569E+00 1.058945775E+00
1.066079855E+00 1.068216205E+00 1.069613576E+00 1.070097446E+00 1.069476485E+00
1.067933202E+00 1.058326840E+00
```

Listing 5.4 Standard Output File: MICRO_X_TPS.OUT





2	90	200				
3 - 4 -						
5 -	4 DESVAR 2 CONT 8 CONT 20 CONT 32	3	4			CONT
6 -	CONT 8	6	69			CONT
7 – 8 –	CONT 20 CONT 32	18	66 63			CONT
9 -	CONT 413 DESVAR 4 +DE1401 418 +DE1402 442 +DE1403 382 DESVAR 5 +DE1501 423	437	377			CONT
10 -	DESVAR 4	3	3			+DE1401
11 -	+DE1401 418	416	414			+DE1402
12 - 13 -	+DE1402 442	440	438 378			+DE1403
14 -	DESVAR 5	3	3 / 6			+DE1501
15 -	+DE1501 423	421	419			+DE1502
16 -	+DE1502 447	445	443			+DE1503
17 -	+DE1502 447 +DE1503 387 DESVAR 6 +DE1601 194 +DE1602 194 +DE1603 523 DESVAR 7 +DE1701 633 +DE1702 625	385	383			+DE1601
17 - 18 - 19 - 20 - 21 -	+DE1601 194	9 1951	424			+DE1601 +DE1602
20 -	+DE1602 194	1 1943	448			+DE1602
21 -	+DE1603 523	515	388			
22 -	DESVAR 7	3	3			+DE1701
23 - 24 -	+DE1701 633 +DE1702 625	635	636 628			+DE1702 +DE1703
24 - 25 - 26 - 27 - 28 -	+DE1702 023	615	616			+DE1703
26 -	DESVAR 8	3	3			+DE1801
27 -	+DE1801 119	5 1198	1201			+DE1802
28 -	+DE1802 118	1 1184	1187			+DE1803
29 - 30 -	+DE1803 11/	4 11//	3 1180			+DE1901
31 -	+DE1901 191	0 1914	1917			+DE1901 +DE1902
32 -	+DE1902 189	4 1898	1901			+DE1903
33 - 34 - 35 - 36 -	+DE1903 188	6 1890	1893			. DE0000
34 -	DESVAR 10	0 1201	1202	1202		+DE2001
35 - 36 -	+DE2001 129	7 1018	1019	1020		+DE2002 +DE2003
37 -	+DE2003 103	7 1038	1039	1040		+DE2003
38 -	+DE1701 633 +DE1702 625 +DE1703 613 DESVAR 8 +DE1801 119 +DE1803 117 DESVAR 9 +DE1901 191 +DE1902 189 +DE1901 129 +DE2002 101 +DE2001 129 +DE2002 103 +DE2004 677 DESVAR 10 +DE2101 138 +DE2101 138 +DE2102 110 +DE2103 112 DESVAR 12 +DE2201 138 +DE2203 112 DESVAR 13 +DE2203 112 DESVAR 13 +DE2301 181 +DE2301 181 +DE2301 181 +DE2401 181 +DE2401 181 +DE2401 181 +DE2401 181 +DE2401 181 +DE2401 181 +DE2401 181 +DE2401 181 +DE2401 181 +DE2401 181 +DE2401 181	678	679	680		
39 -	DESVAR 11	3 1205	1200			+DE2101 +DE2102
40 -	+DE2101 138	7 1087	1386			+DE2102 +DE2103
40 - 41 - 42 - 43 -	+DE2102 110	1 1131	1126			IDELLOS
43 -	DESVAR 12	3	3			+DE2201
44 -	+DE2201 138	7 1388	1389			+DE2202
45 - 46 -	+DE2202 106	7 1057	1047			+DE2203
47 -	DESVAR 13	3	3			+DE2301
48 -	+DE2301 180	6 1808	1809			+DE2302
48 - 49 - 50 -	+DE2302 173	4 1736	1737			+DE2303
50 -	+DE2303 181	4 1816	1817			
51 - 52 -	DESVAR 14	0 1012	1012			+DE2401 +DE2402
53 -	+DE2401 181	8 1740	1741			+DE2402
54 -	+DE2403 181	8 1820	1821			
55 -	DESVAR 15	3	3			+DE2501
56 - 57 -	+DE2501 55	57	59			+DE2502 +DE2503
58 -	+DE2502 195	127	129			TDE2503
59 -	+DE2402 173 +DE2403 181 DESVAR 15 +DE2501 55 +DE2502 195 +DE2503 125 DESVAR 16 +DE2601 389	3	3			+DE2601
60 -	+DE2601 389	52	54			+DE2602
			174			+DE2603
62 - 63 -	+DE2003 310	3	124 3			+DE2701
64 -	+DE2701 394	392	390			+DE2702
65 -	+DE2702 269	285	301			+DE2703
66 -	+DE2603 316 DESVAR 17 +DE2701 394 +DE2702 269 +DE2703 276	292	308			
67 – 68 –	DESVAR 18 +DE2801 399	3	3 395			+DE2801 +DE2802
69 -	+DE2801 399		261			+DE2802
70 -	+DE2803 236	252	268			
71 -	DESVAR 19		3			+DE2901
72 - 73 -	+DE2901 522 +DE2902 461		400 221			+DE2902 +DE2903
73 - 74 -	+DE2902 461 +DE2903 468		221			±₽₽₹303
75 -	DESVAR 20		3			+DE3001
76 -	+DE3001 609	611	612			+DE3002
77 -	+DE3002 557		581 588			+DE3003
78 – 79 –	+DE3003 564 DESVAR 21		3			+DE3101
80 -	+DE3101 941	938	717			+DE3101
81 -	+DE3102 125	4 1257	757			+DE3103
82 -	+DE3103 120	5 1208	764			
83 - 84 -	DESVAR 22 +DE3201 159		3 942			+DE3201 +DE3202
84 - 85 -	+DE3201 159 +DE3202 162		942 1253			+DE3202 +DE3203
86 -	+DE3202 102					
87 -	DESVAR 23	3	3			+DE3301
88 -	+DE3301 159 +DE3302 162	7 1594	1592			+DE3302
89 – 90 –	+DE3302 162 +DE3303 168		1624 1680			+DE3303
91 -	DESVAR 24		3			+DE3401
92 -	+DE3401 834	824	804			+DE3402
93 -	+DE3402 827		797			+DE3403
94 - 95 -	+DE3403 134 DESVAR 25	7 1346 3	1344 3			+DE3501
96 -	+DE3501 794		3 774			+DE3501 +DE3502
97 -	+DE3501 751		767			+DE3502

98	_	+DE3503	1343	1342	1341						
99		DESVAR	26		3						+DE3601
100	-	DESVAR +DE3601 +DE3602	1397	1396	1394 1450						+DE3602
101	-	+DE3602	1453	1452	1450						+DE3603
102	-	+DE3603	1470	1471	1472						
103	-	DESVAR	27	3	3						+DE3701
104	-	+DE3701	1393	1392	1390						+DE3702
105	-	+DE3701 +DE3702 +DE3703	1449	1448	1446						+DE3703
106	-	+DE3703	1474	1475	1477						
107	-	DESVAR +DE3701	28	2	4						+DE3701
108	-	+DE3701	1882	1885							+DE3702
109		+DE3702		1877							+DE3703
110		+DE3703 +CONT		1869 1861							+CONT
111 112	_	DESVAR	1020		4						+DE2001
113		+DE2001			1271	1270					+DE2001
114		· DE2002	0.40	0.0	860	870					+DE2003
115	_	+DE2003	835	845	855	865					+DE2004
116	_	+DE2002 +DE2003 +DE2004	697	845 698 3	699	700					
117	-	DESVAR	30	3	3						+DE2001
118		+DE2001	10210	10201							+DE2002
119	-	+DE2002	10105	10096	10091						+DE2003
120		+DE2003		10006							
121		PANLST2	1		1	2		4	50		+PN1101
122	-	+PN1101 +PN1102	70	80	90	100	110	120			+PN1102
123	-	+PN1102	150	80 160 204	170	180	190	200	201		+PN1103
124		+PN1103	203	204	205	206					+PN1104
125 126		+PN1104 +PN1105	211	212 220	213	214	215	216	217	218	+PN1105
127	_	DAMILGT2	2		5	6	7	8	9	10	+PN1201
128	_	+PN1201	11	12	13	14		16	17		+PN1202
129	_	+PN1202	19	20	21	2.2	22	24	65	66	+PN1203
130	_	+PN1201 +PN1202 +PN1203 CONT	67	68	69 27 35	75	76	77	78	79	CONT
131	_	CONT	25	26	27	28	29	30	31	32	CONT
132	-	CONT	33	34	35	36	37	38	39	40	CONT
133	-	CONT	61	62	63	64	71	72	73	74	CONT
134	-	CONT	365	377	413	425	437	449			
135	-	PANLST2	4		366	367	368	369	370	378	+PN1401
136	-	+PN1401	379	380	381	382	414	415	416	417	+PN1402
137	-	+PN1402	418	426	427	428	429	430	438	439	+PN1403
138	-	+PN1403	440	441	442	450	451	452	453	454	
139	-	PANLST2	5		371	372	373	374	375	383	+PN1501
140	-	+PN1501	384	385	386	387	419	420	421	422	+PN1502
141	-	+PN1502	423	431	432	433	434	435	443	444	+PN1503
142 143	-	+PNI5U3	445	440	276	200	450	45/	458	459	DN1 601
144	_	PHINTSIZ	U		3/0	300	424	430	440	400	TPN1001
	_	±DN11601	E11	E12	515	516	510	520	522	524	
	-	+PN1601	511 1937	512 1938	515	516 1940	519 1941	520 1942	523 1943	524 1944	+PN1602
145	- -	+PN1601 +PN1602 +PN1603	511 1937 1945	512 1938 1946	515 1939 1947	516 1940 1948	519 1941 1949	520 1942 1950	523 1943 1951	524 1944 1952	+PN1602 +PN1603
145 146	- - -	+PN1601 +PN1602 +PN1603 PANLST2	511 1937 1945 7	512 1938 1946	515 1939 1947 613	516 1940 1948 614	519 1941 1949 615	520 1942 1950 616	523 1943 1951 617	524 1944 1952 618	+PN1602 +PN1603 +PN1701
145 146 147	- - - -	+PN1601 +PN1602 +PN1603 PANLST2 +PN1701	511 1937 1945 7 619	512 1938 1946	515 1939 1947 613 621	516 1940 1948 614 622	519 1941 1949 615 623	520 1942 1950 616 624	523 1943 1951 617 625	524 1944 1952 618 626	+PN1602 +PN1603 +PN1701 +PN1702
145 146	- - - -	+PN1601 +PN1602 +PN1603 PANLST2 +PN1701 +PN1702	511 1937 1945 7 619 627	512 1938 1946 620 628	515 1939 1947 613 621 629	516 1940 1948 614 622 630	519 1941 1949 615 623 631	520 1942 1950 616 624 632		524 1944 1952 618 626 634	+PN1602 +PN1603 +PN1701 +PN1702 +PN1703
145 146 147 148	_	TPN1702	627	020	029	030	031	032	033	034	+PN1602 +PN1603 +PN1701 +PN1702 +PN1703
145 146 147 148 149 150 151	_	TPN1702	627	020	029	030	031	032	033	034	+PN1602 +PN1603 +PN1701 +PN1702 +PN1703 +PN1801
145 146 147 148 149 150 151	_	TPN1702	627	020	029	030	031	032	1178	1179 1187	+PN1801 +PN1802
145 146 147 148 149 150 151 152	_	TPN1702	627	020	029	030	031	032	1178	1179 1187	+PN1801
145 146 147 148 149 150 151 152 153 154	_	TPN1702	627	020	029	030	031	032	1178 1186 1194	1179 1187 1195	+PN1801 +PN1802 +PN1803
145 146 147 148 149 150 151 152 153 154	_	TPN1702	627	020	029	030	031	032	1178 1186 1194	1179 1187 1195	+PN1801 +PN1802 +PN1803 +PN1901
145 146 147 148 149 150 151 152 153 154 155	_	TPN1702	627	020	029	030	031	032	1178 1186 1194	1179 1187 1195 1891 1899	+PN1801 +PN1802 +PN1803 +PN1901 +PN1902
145 146 147 148 149 150 151 152 153 154 155 156 157	_	TPN1702	627	020	029	030	031	032	1178 1186 1194 1890 1898 1906	1179 1187 1195 1891 1899 1907	+PN1801 +PN1802 +PN1803 +PN1901 +PN1902 +PN1903
145 146 147 148 149 150 151 152 153 154 155 156 157	-	+PN1702 +PN1703 PANLST2 +PN1801 +PN1802 +PN1803 PANLST2 +PN1901 +PN1902 +PN1903	635 8 1180 1188 1196 9 1892 1900	636 1181 1189 1197 1893 1901 1909	029	1175 1183 1191 1199 1887 1895 1903 1911	1176 1184 1192 1200 1888 1896 1904 1912	032	1178 1186 1194 1890 1898 1906	1179 1187 1195 1891 1899 1907	+PN1801 +PN1802 +PN1803 +PN1901 +PN1902
145 146 147 148 149 150 151 152 153 154 155 156 157 158	-	+PN1702 +PN1703 PANLST2 +PN1801 +PN1802 +PN1802 +PN1901 +PN1901 +PN1902 +PN1903 +PN1904	635 8 1180 1188 1196 9 1892 1900 1908	020	1936 1174 1182 1190 1198 1886 1894 1902 1910	1175 1183 1191 1199 1887 1895 1903 1911	1176 1184 1192 1200 1888 1896 1904 1912	1177 1185 1193 1201 1889 1897 1905 1913	1178 1186 1194 1890 1898 1906 1914	1179 1187 1195 1891 1899 1907 1915	+PN1801 +PN1802 +PN1803 +PN1901 +PN1902 +PN1903 +PN1904
145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160	-	+PN1703 PANLST2 +PN1801 +PN1802 +PN1803 PANLST2 +PN1901 +PN1902 +PN1904 +PN1904 PANLST2	627 635 8 1180 1188 1196 9 1892 1900 1908 1916	636 1181 1189 1197 1893 1901 1909 1917	1936 1174 1182 1190 1198 1886 1894 1902 1910	1175 1183 1191 1199 1887 1895 1903 1911	1176 1184 1192 1200 1888 1896 1904 1912	1177 1185 1193 1201 1889 1897 1905 1913	1178 1186 1194 1890 1898 1906 1914	1179 1187 1195 1891 1899 1907 1915	+PN1703 +PN1801 +PN1802 +PN1803 +PN1901 +PN1902 +PN1903 +PN1904 +CON
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193 - 194 -										
194 -	PANLST2	13		1686	1687	1688	1689	1694	1695	+CON
	+CON	1696	1697	1702	1703	1704	1705	1710	1711	+CON
195 -	+CON	1712	1713	1718	1719	1720	1721	1726	1727	+CON
196 -	+CON	1728	1729	1734	1735	1736	1737	1742	1743	+CON
197 -	+CON	1744	1745	1750	1751	1752	1753	1758	1759	+CON
198 -	+CON	1760	1761	1766	1767	1768	1769	1774	1775	+CON
199 -	+CON	1776	1777	1782	1783	1784	1785	1790	1791	+CON
200 -	+CON	1792	1793	1798	1799	1800	1801		1807	+CON
201 -	+CON	1808	1809	1814	1815	1816	1817	1822	1823	+CON
202 -	+CON	1824	1825	1830	1831	1832	1833	1838	1839	+CON
203 -	+CON	1840	1841	1846	1847	1848	1849			
			1041							
204 -	PANLST2			1690	1691	1692	1693	1698	1699	+PN2401
205 -	+PN2401	1700	1701	1706	1707	1708	1709	1714	1715	+PN2402
206 -	+PN2402	1716	1717	1722	1723	1724	1725	1730	1731	+PN2403
207 -	+PN2403		1733	1738	1739	1740	1741	1746	1747	+PN2404
			1749							
208 -	+PN2404			1754	1755	1756	1757	1762	1763	+PN2405
209 -	+PN2405	1764	1765	1770	1771	1772	1773	1778	1779	+PN2406
210 -	+PN2406	1780	1781	1786	1787	1788	1789	1794	1795	+PN2407
211 -	+PN2407		1797	1802	1803	1804	1805		1811	+PN2408
212 -	+PN2408		1813	1818	1819	1820	1821		1827	+PN2409
213 -	+PN2409		1829	1834	1835	1836	1837		1843	+PN2410
214 -	+PN2410	1844	1845	1850	1851	1852	1853	1854	1855	+PN2411
215 -	+PN2411	1856	1857	1862	1863	1864	1865	1870	1871	+PN2412
216 -	+PN2412		1873	1878	1879	1880	1881	1929	1930	+PN2413
				10,0	10,5	1000	1001	1020	1930	
217 -	+PN2413		1933							
218 -	PANLST2			45	46	47	48	49	55	+PN2501
219 -	+PN2501	56	57	58	59	85	86	87	88	+PN2502
220 -	+PN2502	89	95	96	97	98	99	105	106	+PN2503
221 -	+PN2503		108	109	115	116	117	118	119	+PN2504
222 -	+PN2504		126	127	128	129	135	136	137	+PN2505
223 -	+PN2505	138	139	145	146	147	148	149	155	+PN2506
224 -	+PN2506	156	157	158	159	165	166	167	168	+PN2507
225 -	+PN2507		175	176	177	178	179	185	186	+PN2508
										TFN2300
226 -	+PN2508		188	189	195	196	197		199	
227 -	PANLST2			41	42	43	44	51	52	+PN2601
228 -	+PN2601	53	54	81	82	83	84	91	92	+PN2602
229 -	+PN2602	93	94	101	102	103	104	111	112	+PN2603
230 -	+PN2603		114	121	122	123	124			+PN2604
231 -	+PN2604		134	141	142	143	144	151	152	+PN2605
232 -	+PN2605	153	154	161	162	163	164	171	172	+PN2606
233 -	+PN2606	173	174	181	182	183	184	191	192	+PN2607
234 -			194	309	310	311			314	
	+PN2607						312	313		+PN2608
235 -	+PN2608		316	317	329	341	353	389	401	
236 -	PANLST2	17		269	270	271	272	273	274	+PN2701
237 -	+PN2701	275	276	277	278	279	280	281	282	+PN2702
238 -	+PN2702		284	285	286	287	288	289	290	+PN2703
239 -	+PN2703		292	293	294	295	296	297	298	+PN2704
240 -	+PN2704	299	300	301	302	303	304	305	306	+PN2705
241 -	+PN2705	307	308	318	319	320	321	322	330	+PN2706
242 -	+PN2706		332	333	334	342	343	344	345	+PN2707
243 -	+PN2707		354	355	356	357	358	390	391	+PN2708
244 -	+PN2708	392	393	394	402	403	404	405	406	
245 -	PANLST2	18		229	230	231	000			
246 -					230	231	232	233	234	+PN2801
			236	237			232	233		
	+PN2801		236	237	238	239	240	241	242	+PN2802
247 -	+PN2802	243	244	245	238 246	239 247	240 248	241 249	242 250	+PN2802 +PN2803
247 - 248 -	+PN2802 +PN2803	243 251	244 252	245 253	238 246 254	239 247 255	240 248 256	241 249 257	242 250 258	+PN2802 +PN2803 +PN2804
247 -	+PN2802	243 251	244	245	238 246	239 247	240 248	241 249	242 250	+PN2802 +PN2803
247 - 248 -	+PN2802 +PN2803 +PN2804	243 251 259	244 252 260	245 253 261	238 246 254 262	239 247 255 263	240 248 256 264	241 249 257 265	242 250 258 266	+PN2802 +PN2803 +PN2804 +PN2805
247 - 248 - 249 - 250 -	+PN2802 +PN2803 +PN2804 +PN2805	243 251 259 267	244 252 260 268	245 253 261 323	238 246 254 262 324	239 247 255 263 325	240 248 256 264 326	241 249 257 265 327	242 250 258 266 335	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806
247 - 248 - 249 - 250 - 251 -	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806	243 251 259 267 336	244 252 260 268 337	245 253 261 323 338	238 246 254 262 324 339	239 247 255 263 325 347	240 248 256 264 326 348	241 249 257 265 327 349	242 250 258 266 335 350	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807
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247 - 248 - 249 - 250 - 251 - 252 - 253 -	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808	243 251 259 267 336 351 397	244 252 260 268 337	245 253 261 323 338 360 399	238 246 254 262 324 339 361 407	239 247 255 263 325 347 362 408	240 248 256 264 326 348 363 409	241 249 257 265 327 349 395 410	242 250 258 266 335 350 396 411	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808
247 - 248 - 249 - 250 - 251 - 252 -	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807	243 251 259 267 336 351 397	244 252 260 268 337 359	245 253 261 323 338 360	238 246 254 262 324 339 361	239 247 255 263 325 347 362	240 248 256 264 326 348 363	241 249 257 265 327 349 395	242 250 258 266 335 350 396	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807
247 - 248 - 249 - 250 - 251 - 252 - 253 - 254 -	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808	243 251 259 267 336 351 397	244 252 260 268 337 359 398	245 253 261 323 338 360 399 221	238 246 254 262 324 339 361 407	239 247 255 263 325 347 362 408 223	240 248 256 264 326 348 363 409 224	241 249 257 265 327 349 395 410	242 250 258 266 335 350 396 411 226	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808 +PN2901
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247 - 248 - 249 - 250 - 251 - 252 - 253 - 254 - 255 - 256 - 257 - 258 -	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808 PANLST2 +PN2901 +PN2902 +PN2903 +PN2904	243 251 259 267 336 351 397 19 227 461 469 477	244 252 260 268 337 359 398 228 462 470 478	245 253 261 323 338 360 399 221 328 463 471 479	238 246 254 262 324 339 361 407 222 340 464 472 480	239 247 255 263 325 347 362 408 223 352 465 473 481	240 248 256 264 326 348 363 409 224 364 466 474 482	241 249 257 265 327 349 395 410 225 400 467 475 483	242 250 258 266 335 350 396 411 226 412 468 476 484	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808 +PN2901 +PN2901 +PN2902 +PN2903 +PN2904 +PN2905
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247 - 248 - 249 - 250 - 251 - 252 - 253 - 254 - 255 - 256 - 257 - 258 - 259 - 260 - 261 - 262 - 263 -	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808 PANLST2 +PN2901 +PN2903 +PN2904 +PN2905 +PN2906 +PN2906 +PN2908 PANLST2	243 251 251 267 336 351 19 227 461 469 477 485 493 501 509 20 563	244 252 260 268 337 359 398 228 462 470 478 486 494 502 510	245 253 261 323 338 360 399 221 328 463 471 479 487 495 503 513 557 565	238 246 254 262 324 339 339 340 464 472 222 340 480 480 480 554 554 556 574	239 247 255 263 325 347 362 408 223 352 465 473 481 489 497 505 517 559 567 575	240 248 256 264 326 348 409 224 466 474 482 490 498 506 5518 560	241 249 257 265 327 395 410 467 475 483 491 499 507 521 561 569	242 250 258 266 335 396 411 226 412 468 476 484 492 500 508 522 570	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808 +PN2901 +PN2902 +PN2902 +PN2903 +PN2905 +PN2906 +PN2906 +PN2908 +PN3001
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247 - 248 - 249 - 250 - 251 - 252 - 253 - 254 - 255 - 256 - 257 - 258 - 259 - 260 - 261 - 262 - 263 - 264 - 265 - 266 - 267 - 268 - 269 -	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2807 +PN2901 +PN2901 +PN2901 +PN2905 +PN2907 +PN2908 PANLST2 +PN2906 +PN2907 +PN2908 PANLST2 +PN3001 +PN3002 +PN30003 +PN3003	243 251 259 267 336 351 397 19 227 461 469 477 485 493 501 509 20 563 571 579 587 595	244 252 260 268 337 398 228 462 470 478 486 494 502 510 564 572 580 588	245 253 328 338 360 399 221 328 463 471 479 487 495 503 513 557 565 573 589	238 246 242 254 262 324 339 361 407 222 340 464 472 480 488 496 504 514 558 566 574 582 590 598	239 247 255 263 325 347 362 408 352 465 473 481 489 497 505 517 559 567 575 583 591	240 248 256 264 326 348 363 409 224 364 464 474 482 490 498 506 518 560 568 576 576 578 592	241 249 257 265 347 349 395 410 225 400 467 475 483 491 499 507 521 561 557 585 585 593 601	242 250 258 266 335 330 396 411 226 442 468 476 484 492 500 508 522 562 570 578 586 594 602	+PN2802 +PN2803 +PN2804 +PN2805 +PN2806 +PN2807 +PN2808 +PN2901 +PN2902 +PN2903 +PN2905 +PN2906 +PN2908 +PN2908 +PN2908 +PN3001 +PN3002 +PN3003 +PN3003 +PN3005
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288		+PN3204		1245	1246	1251	1252	1253	1590	1591	+PN3205
289		+PN3205		1599	1606	1607	1614	1615	1622	1623	+PN3206
290		+PN3206		1631	1638	1639	1646	1647	1654	1655	+PN3207
291		+PN3207		1663	1670	1671	1678	1679			
292		PANLST2			1592	1593	1594	1595	1596	1597	+PN3301
293		+PN3301		1601	1602	1603	1604	1605	1608	1609	+PN3302
294		+PN3302		1611	1612	1613	1616	1617	1618	1619	+PN3303
295		+PN3303		1621	1624	1625	1626	1627	1628	1629	+PN3304
296		+PN3304		1633	1634	1635	1636	1637	1640	1641	+PN3305
297		+PN3305		1643	1644	1645	1648	1649	1650	1651	+PN3306
298		+PN3306		1653	1656	1657	1658	1659	1660	1661	+PN3307
299		+PN3307		1665	1666	1667	1668	1669	1672	1673	+PN3308
300		+PN3308		1675	1676	1677	1680	1681	1682	1683	+PN3309
301		+PN3309		1685							
302		PANLST2			795	796	797	798	799	800	+PN3401
303		+PN3401		802	803	804	805	806	807	808	+PN3402
304		+PN3402		810	811	812	813	814	815	816	+PN3403
305		+PN3403		818	819	820	821	822	823	824	+PN3404
306		+PN3404		826	827	828	829	830	831	832	+PN3405
307		+PN3405		834	875	876	877	878	882	883	+PN3406
308		+PN3406		885	889	890	891	892	896	897	+PN3407
309		+PN3407		899	903	904	905	906	910	911	+PN3408
310		+PN3408		913	917	918	919	920	924	925	+PN3409
311		+PN3409		927	931	932	933	934	1309	1310	+PN3410
312		+PN3410		1312	1316	1317	1318	1319	1323	1324	+PN3411
313		+PN3411		1326	1330	1331	1332	1333	1337	1338	+PN3412
314		+PN3412		1340	1344	1345	1346	1347			
315		PANLST2			765	766	767	768	769	770	+PN3501
316		+PN3501		772	773	774	775	776	777	778	+PN3502
317		+PN3502		780	781	782	783	784	785	786	+PN3503
318		+PN3503		788	789	790	791	792	793	794	+PN3504
319	-	+PN3504	879	880	881	886	887	888	893	894	+PN3505
320		+PN3505	895	900	901	902	907	908	909	914	+PN3506
321	-	+PN3506	915	916	921	922	923	928	929	930	+PN3507
322	-	+PN3507	935	936	937	1306	1307	1308	1313	1314	+PN3508
323	-	+PN3508	1315	1320	1321	1322	1327	1328	1329	1334	+PN3509
324	-	+PN3509	1335	1336	1341	1342	1343				
325	-	PANLST2	26		1394	1395	1396	1397	1402	1403	+PN3601
326	-	+PN3601	1404	1405	1410	1411	1412	1413	1418	1419	+PN3602
327	-	+PN3602	1420	1421	1426	1427	1428	1429	1434	1435	+PN3603
328	-	+PN3603	1436	1437	1442	1443	1444	1445	1450	1451	+PN3604
329	-	+PN3604	1452	1453	1458	1459	1460	1461	1466	1467	+PN3605
330	-	+PN3605	1468	1469	1470	1471	1472	1473	1478	1479	+PN3606
331	-	+PN3606	1480	1481	1486	1487	1488	1489	1494	1495	+PN3607
332	-	+PN3607	1496	1497	1502	1503	1504	1505	1510	1511	+PN3608
333		+PN3608	1 5 1 0	1 5 1 2			1 5 0 0	1 0 0 1	1526	1527	+PN3609
	-	TPN3000	1512	1513	1518	1519	1520	1521	1320	132/	
334		+PN3608		1513	1518	1519 1535	1520	1521	1542	1543	+PN3610
334 335	-		1528								
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335 336 337	- - - -	+PN3609 +PN3610 +PN3611	1528 1544 1560 1576 1920	1529 1545 1561 1577	1534 1550 1566	1535 1551 1567	1536 1552 1568	1537 1553 1569	1542 1558 1574	1543 1559 1575	+PN3610 +PN3611 +PN3612
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3355 3363 3377 3388 3399 3411 3422 3533 3543 3552 3553 3553 3553 3553		+PN3609 +PN3610 +PN3611 +PN3611 +PN3611 +PN3612 +PN3701 +PN3702 +PN3703 +PN3705 +PN3706 +PN3707 +PN3708 +PN3707 +PN3708 +PN3709 +PN3710 +PN3711 +PN3712 +PN3711 +PN3712 +PN3710 +CON +CON +CON +CON +CON +CON +CON +CON	1528 1548 1540 1576 1920 27 1400 1412 1432 1448 1464 1500 1516 1532 1548 1560 1924 28 1876 1860 29 687 695 837 695 837 845 861 869 1260 1268 30 10007 10023 10031 10033 10031 10071 10079 10079 10085	1529 1545 1561 1577 1921 1401 1417 1433 1449 1465 1501 1517 1533 1549 1565 1581 1932 1877 1861 688 696 838 846 854 862 870 1261 1269 10008 10008 10014 10024 10032 10048 10048 10072 10080 10072 10080 10088 10096	1534 1550 1566 1582 1390 1406 1422 1438 1454 1474 1490 1506 1522 1538 1554 1570 1586 1882 1866 681 689 697 839 847 855 863 871 1262 1270 10001 10009 10017 10025 10033 10049 10049 10057 10081 10089 10089 10087	1535 1551 1567 1583 1391 1407 1423 1439 1455 1475 1471 1507 1523 1555 1571 1883 1867 682 690 698 840 840 848 856 864 872 1263 1271 10002 10018 10026 10034 10042 10050 10058 10074 10082 10098	1536 1552 1568 1584 1392 1408 1424 1440 1456 1476 1590 1556 1572 1508 1524 1640 1556 1572 1608 1699 841 1868 683 691 699 841 1868 683 691 10099 10007 10003 10007 10005 100083 10007 10009	1537 1553 1569 1585 1409 1425 1441 1457 1477 1571 1573 1599 1525 1541 1557 1573 1686 1684 1692 1692 1692 1692 1692 1692 1692 1692	1542 1558 1574 1918 1398 1414 1430 1446 1462 1498 1514 1550 1576 1578 1922 1874 1858 685 693 835 843 851 1266 10005 10013 10021 10029 10077 10045 10069 10077 10065 10093 100101 100109 1	1543 1559 1575 1919 1399 1415 1447 1463 14483 14483 1449 1515 1531 1547 1563 1579 1875 1889 686 694 836 844 848 852 860 10014 10022 10030 10038 10046 10054 10062 10078 10078 10078 10094 1009	+PN3610 +PN3611 +PN3612 +PN3613 +PN3701 +PN3702 +PN3703 +PN3706 +PN3707 +PN3706 +PN3709 +PN3710 +PN3711 +PN3711 +PN3711 +PN3711 CONT CONT +CON +CON +CON +CON +CON +CON +CON +CON
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3355 3366 341 342 343 344 350 352 353 355 356 357 358 361 362 363 364 363 364 367 367 368 369 370 370 370 370 370 370 370 370 370 370		+PN3609 +PN3610 +PN3611 +PN3611 +PN3611 +PN3611 +PN3701 +PN3702 +PN3703 +PN3703 +PN3705 +PN3706 +PN3707 +PN3708 +PN3709 +PN3710 +PN3711 +PN3711 +PN3711 +PN3712 +PN3712 +PN3710 +CON +CON +CON +CON +CON +CON +CON +CON	1528 1544 1560 1576 1920 27 1400 1412 1432 1448 1464 1516 1532 1548 1564 1580 1924 28 1876 1860 29 687 695 8837 845 8853 861 869 1260 10007 10015 10023 10047 10053 10071 10063 10071 10087 10087 10095 10095 10011	1529 1545 1561 1577 1921 1401 1417 1433 1449 1465 1501 1517 1533 1549 1565 1581 1932 1877 1861 688 696 838 846 854 870 1261 1269 10008 10016 10024 10032 10048 10056 10072 10088 10096 10096 10096 10096 100112	1534 1550 1566 1582 1390 1406 1422 1438 1454 1474 1490 1506 1522 1538 1554 1570 1586 1882 1866 681 689 697 836 871 1262 1270 10001 10009 10057 10033 10041 10049 10057 10065 10073 10081 10089 10097 10013	1535 1551 1567 1583 1391 1407 1423 1439 1455 1475 1491 1507 1523 1539 1555 1571 1587 1883 1867 682 690 698 840 848 872 1263 1271 10002 10010 10018 10074 10080 10098 10098 10098 100114	1536 1552 1568 1584 1392 1408 1424 1440 1456 1476 1492 1508 1552 1572 1588 1884 1868 683 691 699 841 849 857 10003 10011 10027 10035 10011 10027 10035 10067 10075 10083 10091 10099 10099 10017 10115	1537 1553 1569 1585 1393 1409 1425 1441 1457 1441 1557 1525 1541 1557 1573 1589 1885 1869 684 692 700 858 842 850 858 842 850 874 1265 1273 10004 10012 10020 10028 10036 10040 10068 10076 10068 10076 10084 10092 10100 10108 10116	1542 1558 1574 1918 1398 1414 1430 1446 1462 1498 1514 1530 1546 1562 1578 1922 1874 1858 685 693 835 843 851 869 10013 10021 10029 10037 10045 10069 10077 10069 10077 10093 10109 10117	1543 1559 1575 1919 1399 1415 1431 1447 1463 1449 1515 1531 1531 1547 1563 1579 1923 1875 1859 686 694 836 844 852 860 10014 10022 10030 10038 10046 10054 10070 10078 10094 10094 10102 10010 100118	+PN3610 +PN3611 +PN3612 +PN3613 +PN3701 +PN3702 +PN3703 +PN3704 +PN3706 +PN3706 +PN3706 +PN3707 +PN3706 +PN3707 +PN3707 +PN3708 +PN3711 -PN3711 -PN3711 -CONT -CONT -CON +CON +CON +CON +CON +CON +CON +CON +

383 -	+CON	10135	10136	10137	10138	10139	10140	10141	10142	+CON
384 -	+CON	10143	10144	10145	10146	10147	10148	10149	10150	+CON
385 -	+CON	10151	10152	10153	10154	10155	10156	10157	10158	+CON
386 -	+CON	10159	10160	10161	10162	10163	10164	10165	10166	+CON
387 -	+CON	10167	10168	10169	10170	10171	10172	10173	10174	+CON
388 -	+CON	10175	10176	10177	10178	10179	10180	10181	10182	+CON
389 -	+CON	10183	10184	10185	10186	10187	10188	10189	10190	+CON
390 -	+CON	10191	10192	10193	10194	10195	10196	10197	10198	+CON
391 -	+CON	10199	10200	10201	10202	10203	10204	10205	10206	+CON
392 -	+CON	10207	10208	10209	10210	10421	10422	10423	10424	+CON
393 -	+CON	10425	10426	10427	10428	10429	10430	10431	10432	+CON
394 -	+CON	10433	10434	10435						
395 -	PANLST2	1.0.1		130	201	90	209	4	220	CONT
				130	201	50	203	-	220	CONI
396 -	CONT	170								
397 -	PANLST2	102		8	6	69	20	18	66	CONT
398 -	CONT	32	30	63	413	437	377			
			50					440	420	. 531403
399 -	PANLST2			418	416	414	442	440	438	+PA1403
400 -	+PA1403	382	380	378						
401 -	PANLST2			423	421	419	447	445	443	+PA1503
					721	417	11/	113	113	TEMIJUJ
402 -	+PA1503		385	383						
403 -	PANLST2	106		1949	1951	424	1941	1943	448	+PA1603
404 -	+PA1603	523	515	388						
			313		625	636	605	C 0 F	600	. 53 1 7 0 3
405 -	PANLST2			633	635	636	625	627	628	+PA1703
406 -	+PA1703	613	615	616						
407 -	PANLST2			1195	1198	1201	1180	1184	1187	+PA1803
					1130	1201	1100	1104	1107	TEMIOUS
408 -	+PA1803	1174	1177	1181						
409 -	PANLST2	109		1910	1914	1917	1894	1898	1901	+PA1903
410 -	+PA1903		1890	1893						
			1000							
411 -	PANLST2	110		1290	1291	1292	1293	1017	1018	CONT
412 -	CONT	1019	1020	1037	1038	1039	1040	677	678	CONT
413 -	CONT	679	680	-			-			
			300	1200	1225	1225	1105	1005	1055	
414 -	PANLST2	111		1383	1385	1386	1107	1087	1077	+PA2103
415 -	+PA2103	1141	1131	1126						
					1200	1200	1067	1057	1047	. D. 2. 2. 2. 2. 2
416 -	PANLST2			1387	1388	1389	1067	1057	1047	+PA2203
417 -	+PA2203	1121	1116	1111						
418 -	PANLST2			1806	1808	1809	1734	1736	1737	+PA2303
					1000	1000	1731	1750	1,5,	11H2505
419 -	+PA2303		1816	1817						
420 -	PANLST2	114		1810	1812	1813	1738	1740	1741	+PA2403
421 -	+PA2403		1820	1821						
			1020							
422 -	PANLST2	115		55	57	59	195	197	199	+PA2503
423 -	+PA2503	125	127	129						
424 -					F 0	54	200	100	104	. D. 2.C.0.2
	PANLST2			389	52	34	309	192	194	+PA2603
425 -	+PA2603	316	122	124						
426 -	PANLST2	117		394	392	390	269	285	301	+PA2703
427 -	+PA2703		292	308						
			292							
428 -	PANLST2	118		399	397	395	229	245	261	+PA2803
429 -	+PA2803	236	252	268						
					E14	400	1.61	477	221	
430 -	PANLST2			522	514	400	461	477	221	+PA2903
431 -	+PA2903	468	484	228						
432 -	PANLST2	120		609	611	612	557	573	581	+PA3003
			F00		011	012	55.	5.5	501	. 1115005
433 -	+PA3003		580	588						
434 -	PANLST2	121		941	938	717	1254	1257	757	+PA3103
435 -	+PA3103	1205	1208	764						
436 -	PANLST2			1591	944	942	1623	1251	1253	+PA3203
					244	942	1023	1231	1233	TPM3203
437 -	+PA3203	1679	1202	1204						
438 -	PANLST2	123		1597	1594	1592	1629	1626	1624	+PA3303
439 -	+PA3303		1683	1680						
			1003							
440 -	PANLST2	124		834	824	804	827	817	797	+PA3403
441 -	+PA3403	1347	1346	1344						
				794	784	774	787	777	767	+PA3503
442 -	PANLST2				/84	//4	/8/	/ / /	/6/	+PA3503
443 -	+PA3503	1343	1342	1341						
444 -	PANLST2	126		1397	1396	1394	1453	1452	1450	+PA3603
445 -	+PA3603		1471	1472						
			11/1							
446 -	PANLST2	127		1393	1392	1390	1449	1448	1446	+PA3703
447 -	+PA3703	1474	1475	1477						
	PANLST2			1882	1885	1874	1077	1866	1869	COMP
448 -				1002	T000	10/4	1877	1000	1002	CONT
449 -	CONT		1861							
450 -	PANLST2	129		1273	1272	1271	1270	840	850	CONT
451 -		860	870	835	845	855	865	697	698	CONT
				ددد	242	درد	303	001	000	COIAT
452 -		699	700							
453 -	PANLST2	130		10210	10201	10196	10105	10096	10091	CONT
454 -	CONT	10015	10006	10001						
		10013	1							
455 -	PATCH	1	1	101						
456 -	PATCH	2	2	102						
457 -	PATCH PATCH PATCH	4	4	104			1			
	I MI CII	Ė	ŕ							
458 -				105			1			
459 -	PATCH	6	6	106			1			
460 -	PATCH	7	7	107			1			
461 -	PATCH		ø	108			1			
462 -	PATCH	9	9	109			1			
463 -	PATCH	10		110			1			
		11	11				1			
464 -	PATCH	11	11	111						
465 -		12	12	112			1			
466 -	PATCH	1.2		113						
		13	-	114			1			
467	PATCH	1.4	1.4							
467 -	PATCH PATCH	14	14							
468 -	PATCH PATCH	14	14	115			1			
468 -	PATCH PATCH PATCH	14 15	14 15	115			1			
468 - 469 -	PATCH PATCH PATCH PATCH	14 15 16	14 15 16	115 116			1			
468 - 469 - 470 -	PATCH PATCH PATCH PATCH PATCH	14 15 16	14 15 16	115 116 117			1			
468 - 469 -	PATCH PATCH PATCH PATCH	14 15 16	14 15 16	115 116			1			
468 - 469 - 470 - 471 -	PATCH PATCH PATCH PATCH PATCH PATCH PATCH	14 15 16	14 15 16	115 116 117 118			1			
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468 - 469 - 470 - 471 - 472 - 473 -	PATCH PATCH PATCH PATCH PATCH PATCH PATCH PATCH PATCH	14 15 16	14 15 16	115 116 117 118 119 120			1 1 1 1			
468 - 469 - 470 - 471 - 472 - 473 - 474 -	PATCH PATCH PATCH PATCH PATCH PATCH PATCH PATCH PATCH PATCH PATCH	14 15 16 17 18 19 20	14 15 16 17 18 19 20	115 116 117 118 119			1 1 1 1 1			
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573 -	CONT	12	42	1.0	10.	CONT
574 -	CONT	12	23	0.001	1.5	CONT
575 -	CONT	12	24	0.05	1.4	
576 -	TPSSYM		13	4	4	CONT
577 -	CONT	13	21	0.01	2.	CONT
578 -	CONT	13	42	1.0	10.	CONT
579 -	CONT	13	23	0.001	1.5	CONT
580 -	CONT	13	24	0.05	1.4	CONTE
581 - 582 -	TPSSYM		14	4 0.01		CONT
583 -	CONT	14	21		2. 10.	CONT
584 -	CONT	14 14	42 23	1.0	1.5	CONT
585 -	CONT	14	24	0.05	1.4	CONT
586 -	TPSSYM		15	4	4	CONT
587 -	CONT	15	21	0.01	2.	CONT
588 -	CONT	15	42	1.0	10.	CONT
589 -	CONT	15	23	0.001	1.5	CONT
590 -	CONT	15	24	0.05	1.4	
591 -	TPSSYM		16	4	4	CONT
592 -	CONT	16	21	0.01	2.	CONT
593 -	CONT	16	42	1.0	10.	CONT
594 -	CONT	16	23	0.001	1.5	CONT
595 -	CONT	16	24	0.05	1.4	
596 -	TPSSYM	17	17	4	4	CONT
597 -	CONT	17	21	0.01	2.	CONT
598 -	CONT	17	42	1.0	10.	CONT
599 -	CONT	17	23	0.001	1.5	CONT
600 -	CONT	17	24	0.05	1.4	
601 -	TPSSYM		18	4	4	CONT
602 -	CONT	18	21	0.01	2.	CONT
603 -	CONT	18	42	1.0	10.	CONT
604 -	CONT	18	23	0.001		CONT
605 -	CONT	18	24	0.05	1.4	
606 -	TPSSYM		19	4	4	CONT
607 -	CONT	19	21	0.01	2.	CONT
608 -	CONT	19	42	1.0	10.	CONT
609 -	CONT	19	23	0.001		CONT
610 -	CONT	19	24	0.05	1.4	
611 -	TPSSYM		20	4	4	CONT
612 -	CONT	20	21	0.01	2.	CONT
613 -	CONT	20	42	1.0	10.	CONT
614 -	CONT	20	23	0.001	1.5	CONT
615 -	CONT	20	24	0.05		CONTE
616 -	TPSSYM		21	4	4	CONT
617 -	CONT	21	21	0.01	2.	CONT
618 -	CONT	21	42	1.0	10.	CONT
619 -	CONT	21	23	0.001		CONT
620 -	CONT	21	24	0.05	1.4	CONTE
621 -	TPSSYM		22	4	4	CONT
622 - 623 -	CONT	22 22	21 42	0.01	2.	CONT
624 -	CONT	22		1.0	10.	CONT
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625 -	CONT	22	24	0.05	1.4	
626 -	CONT TPSSYM	22 23	24 23	0.05 4	1.4 4	CONT
626 - 627 -	CONT TPSSYM CONT	22 23 23	24 23 21	0.05 4 0.01	1.4 4 2.	CONT
626 - 627 - 628 -	CONT TPSSYM CONT CONT	22 23 23 23	24 23 21 42	0.05 4 0.01 1.0	1.4 4 2. 10.	CONT CONT
626 - 627 - 628 - 629 -	CONT TPSSYM CONT CONT CONT	22 23 23 23 23	24 23 21 42 23	0.05 4 0.01 1.0 0.001	1.4 4 2. 10. 1.5	CONT
626 - 627 - 628 - 629 - 630 -	CONT TPSSYM CONT CONT CONT CONT	22 23 23 23 23 23 23	24 23 21 42 23 24	0.05 4 0.01 1.0 0.001 0.05	1.4 4 2. 10. 1.5	CONT CONT CONT CONT
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626 - 627 - 628 - 629 - 630 - 631 - 632 - 633 - 635 - 636 - 637 - 638 - 640 - 641 - 642 - 644 - 645 - 644 - 655 - 656 - 655 - 655 - 656 - 657 - 658 - 660 - 661 - 662 - 663 - 664 -	CONT TPSSYM CONT CONT CONT CONT CONT CONT CONT CONT	22 23 23 23 23 24 24 24 24 25 25 25 25 26 26 26 26 27 27 27 27 27 27 27 27 27 27 29 28 28 28 28 29 29 29 29 29 30 30 30 30 30 30 30 30 30 30 30 30 30	24 23 24 24 24 24 24 22 23 24 24 22 23 24 22 23 24 22 23 24 22 23 24 22 23 24 22 23 24 22 23 24 26 21 21 22 23 24 26 27 27 27 27 27 27 27 27 27 27 27 27 27	0.05 4 0.01 1.0 0.001 0.05 4 0.01 1.0 0.005 4 0.01 1.0 0.005 4 0.01 1.0 0.005 4 0.01 1.0 0.005 4 0.01 1.0 0.005 4 0.01 1.0 0.005 5 0.001 1.0 0.001 0.05 5 0.001 0.001 0.05 5 0.001	1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.5 1.4 4 2. 10. 1.28333 10. 1.28333 10. 1.28333 4 2. 1.28333	CONT CONT CONT CONT CONT CONT CONT CONT
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21.000
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19.400
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1470.0
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                                                                                                    1.03
           MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4 5
Tmax: 2800.33 2900.33 2700.33 550.33 600.33
Optv: 2797.91 2797.91 2122.77 549.98 549.98
               VALUES OF DESIGN VARIABLES :
  YER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06
1 0.03287 0.03064 0.04464 0.04156 0.26692 0.23816
   2 0.01000 0.01000 0.01000 0.04437
                                  0.01000
   3 1.00000 1.25496 1.37562 1.46831 1.57187
4 0.01488 0.04355 0.03019 0.02513 0.03313
                                          1.97282
   5 \quad 0.05000 \quad 0.05000 \quad 0.05000 \quad 0.05000 \quad 0.05000
THE ORIGINAL OBJECTIVE FUNCTION = 852.1166992
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.2050737
THE TOTAL OPTIMAL WEIGHT = 1.95336740E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.1674E+01
1.0 +
                                                                                  Α
                                                                                        Α
                                                                                            A
     -1.0 +
                       .23 .33 .43 .53 .63
TIME ( X 4.204E-44 )
                                                                .63 .73 .83 .93 1.03
             .13
           OPTIMAL STRUCTURES OF TPS FOR PATCH =
(WITH AVERAGE THICKNESS)
                                                   0 09516 in 2797 9 F
                ACC((N)
                                   thin skin
        0.03000 in. ZIRCONIUM
                                   radiation gap 0.01491 in. 2797.9 F
        0.03000 in. ZIRCONIUM
 _____
                  LI-2200 (N)
                                                   1.41006 in. 2122.8 F
                  RTV-560
                                  thin skin
                                                    0.02467 in. 550.0 F
                  17 LB SIP .16 IN slab
                                                    0.05000 in. 550.0 F
 _____
       THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                   1
                                LAYER03
                 LAYER02
  PANEL LAYER01
                                                         LAYER04
                                                                         LAYER05
    201 0.03064 2351.16 0.01000 2351.16 1.25496 1633.90 0.04355 547.31 0.05000 202 0.01912 2359.71 0.01879 2359.71 1.24416 1992.25 0.03887 550.33 0.05000
                                                                                   549.98
```

```
203
                      0.01293
                                            2381.98
                                                                 0.02377
                                                                                        2381.98
                                                                                                              1.25079
                                                                                                                                    2007.95
                                                                                                                                                         0.03592
                                                                                                                                                                                 550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549.98
           204
                       0.01014
                                             2416.95
                                                                   0.02725
                                                                                        2416.95
                                                                                                              1.26834
                                                                                                                                    2037.49
                                                                                                                                                          0.03412
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549.98
           205
                       0.01000
                                             2462.39
                                                                  0.03049
                                                                                        2462 39
                                                                                                              1 29372
                                                                                                                                    2078 14
                                                                                                                                                         0 03296
                                                                                                                                                                                  550 33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549 98
           206
                       0.01245
                                             2514.58
                                                                  0.03406
                                                                                         2514.58
                                                                                                               1.32568
                                                                                                                                    2126.11
                                                                                                                                                          0.03191
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549.98
                                             2568.45
                                                                                                                                                                                                                              549 98
           207
                       0.01801
                                                                  0.03787
                                                                                        2568.45
                                                                                                               1.36428
                                                                                                                                    2176.61
                                                                                                                                                          0.03047
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
           208
                       0.02738
                                             2619.10
                                                                  0.04137
                                                                                         2619.10
                                                                                                               1.41037
                                                                                                                                    2225.20
                                                                                                                                                          0.02831
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549.98
                       0.04156
                                                                   0.04437
                                                                                                               1.46831
                                                                                                                                     1877.65
                                                                                                                                                                                                      0.05000
                                                                                                                                                                                                                              546.04
           209
                                             2666.28
                                                                                         2666.28
                                                                                                                                                          0.02513
                                                                                                                                                                                  546.04
           210
                       0.05958
                                             2688.91
                                                                  0.04111
                                                                                        2688.91
                                                                                                               1.51658
                                                                                                                                    2297.57
                                                                                                                                                          0.02266
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              531.04
           211
                       0.07904
                                             2710.29
                                                                   0.03771
                                                                                                               1.56356
                                                                                                                                     2322.86
                                                                                                                                                                                  550.33
                                                                                                                                                                                                      0.05000
                                                                                         2710.29
                                                                                                                                                          0.02063
           212
                       0 09982
                                             2730.27
                                                                  0.03452
                                                                                        2730.27
                                                                                                               1.61200
                                                                                                                                    2347.47
                                                                                                                                                          0.01858
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              500.41
                                             2743.09
                                                                                                                                                                                                     0.05000
           213
                       0.11542
                                                                  0.03221
                                                                                         2743.09
                                                                                                               1.64794
                                                                                                                                    2364.01
                                                                                                                                                          0.01703
                                                                                                                                                                                  550.33
                                                                                                                                                                                                                              488.19
           214
                       0.12471
                                             2749.92
                                                                  0.03085
                                                                                         2749.92
                                                                                                               1.66953
                                                                                                                                    2373.13
                                                                                                                                                          0.01607
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              480.60
           215
                       0.13439
                                             2756.47
                                                                  0.02945
                                                                                         2756.47
                                                                                                               1.69258
                                                                                                                                    2382.12
                                                                                                                                                          0.01500
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              472.30
                                             2762.71
                                                                  0.02795
                                                                                         2762.71
                                                                                                               1.71722
                                                                                                                                                                                                      0.05000
           216
                       0.14451
                                                                                                                                     2390.97
                                                                                                                                                          0.01383
                                                                                                                                                                                                                              463.20
           217
                       0.16023
                                             2771.15
                                                                  0.02548
                                                                                        2771.15
                                                                                                               1.75588
                                                                                                                                    2403.57
                                                                                                                                                          0.01197
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              448.50
                                             2781.10
                                                                   0.02161
                                                                                         2781.10
                                                                                                                                     2419.72
                                                                                                                                                                                                      0.05000
                       0.18280
                                                                                                               1.81346
                                                                                                                                                          0.00914
                                                                                                                                                                                  550.33
                                                                                                                                                                                                                              425.73
           219
                       0.20833
                                             2789.98
                                                                  0.01669
                                                                                        2789.98
                                                                                                              1.88388
                                                                                                                                    2435.80
                                                                                                                                                          0.00556
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              396.67
                                             2797.91
                                                                                        2797.91
                                                                                                                                    2106.89
                                                                                                                                                                                                     0.05000
           220
                       0.23816
                                                                  0.01000
                                                                                                               1.97282
                                                                                                                                                          0.00103
                                                                                                                                                                                  358.58
                                                                                                                                                                                                                              358.58
                       0.17569
                                             1793.10
                                                                   0.01000
                                                                                        1793.10
                                                                                                               1.52794
                                                                                                                                    1125.96
                                                                                                                                                          0.03345
                                                                                                                                                                                  549.98
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549.98
                       0.20162
                                             2765.30
                                                                  0.01000
                                                                                        2765.30
                                                                                                               1.54309
                                                                                                                                    2416.18
                                                                                                                                                          0.03347
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              547.62
                                             2775.38
                                                                                         2775.38
                                                                                                                                     2435.07
                                                                                                                                                                                                      0.05000
                                                                                                                                                                                                                              547.56
                       0.23121
                                                                  0.01000
                                                                                                               1.55758
                                                                                                                                                          0.03338
                                                                                                                                                                                  550.33
              4
                       0.26692
                                             2781.20
                                                                  0.01000
                                                                                        2781.20
                                                                                                              1.57187
                                                                                                                                    2451.99
                                                                                                                                                         0.03313
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              547.51
                       0.12499
                                             2706.66
                                                                   0.01000
                                                                                         2706.66
                                                                                                               1.48919
                                                                                                                                     2337.06
                                                                                                                                                          0.03302
                                                                                                                                                                                  550.33
                                                                                                                                                                                                      0.05000
                                                                                                                                                                                                                              547.84
             60
                       0 13543
                                             2718.35
                                                                  0.01000
                                                                                        2718.35
                                                                                                              1.49839
                                                                                                                                    2351.27
                                                                                                                                                          0.03316
                                                                                                                                                                                  550 33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              547 80
                       0.14594
                                             2728.70
                                                                  0.01000
                                                                                        2728.70
                                                                                                              1.50695
                                                                                                                                    2364.26
                                                                                                                                                          0.03327
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              547.77
             70
             80
                       0.15750
                                             2738.63
                                                                  0.01000
                                                                                         2738.63
                                                                                                               1.51562
                                                                                                                                    2377.20
                                                                                                                                                          0.03336
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              547.73
             90
                       0.04464
                                             2531.84
                                                                  0.01000
                                                                                         2531.84
                                                                                                               1.37562
                                                                                                                                    2148.92
                                                                                                                                                          0.03019
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              548.32
                                             2591.61
                                                                                         2591.61
                                                                   0.01000
                                                                                                               1.41141
                                                                                                                                     2210.17
                                                                                                                                                          0.03126
                                                                                                                                                                                  550.33
                                                                                                                                                                                                      0.05000
                                                                                                                                                                                                                              548.17
           110
                       0.08281
                                             2640.19
                                                                  0.01000
                                                                                        2640.19
                                                                                                              1.44230
                                                                                                                                    2261.77
                                                                                                                                                          0.03206
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              548.04
                                             2681.85
                                                                   0.01000
                                                                                                               1.47081
                                                                                                                                                                                                                              547.92
           120
                       0.10648
                                                                                        2681.85
                                                                                                                                     2308.06
                                                                                                                                                          0.03269
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
           130
                       0.03287
                                             1793.10
                                                                  0.01000
                                                                                        1793.10
                                                                                                              1.00000
                                                                                                                                    1459.53
                                                                                                                                                          0.01488
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549.98
                                                                                                               1.07139
                       0.01967
                                             1943.26
                                                                  0.01000
                                                                                                                                    1594.63
                                                                                                                                                                                                     0.05000
           140
                                                                                        1943.26
                                                                                                                                                          0.01815
                                                                                                                                                                                  550.33
                                                                                                                                                                                                                              549.66
                       0.01306
                                             2058.05
                                                                   0.01000
                                                                                         2058.05
                                                                                                               1.12707
                                                                                                                                     1699.03
                                                                                                                                                          0.02062
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549.41
           150
           160
                       0.01042
                                             2156.34
                                                                   0.01000
                                                                                        2156.34
                                                                                                              1.17570
                                                                                                                                    1789.40
                                                                                                                                                          0.02270
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              549.20
                                                                   0.01000
                                                                                         2257.38
                                                                                                               1.22687
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
           180
                       0.01456
                                             2324 09
                                                                   0.01000
                                                                                        2324 09
                                                                                                              1 26147
                                                                                                                                    1946 41
                                                                                                                                                          0.02616
                                                                                                                                                                                  550 33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              548 82
                                             2397.32
                       0.02105
                                                                   0.01000
                                                                                         2397.32
                                                                                                              1.30039
                                                                                                                                    2016.47
                                                                                                                                                          0.02762
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              548.65
           190
           200
                       0.03067
                                             2465.20
                                                                  0.01000
                                                                                        2465.20
                                                                                                              1.33762
                                                                                                                                   2082.57
                                                                                                                                                         0.02894
                                                                                                                                                                                  550.33
                                                                                                                                                                                                     0.05000
                                                                                                                                                                                                                              548.49
                                           OPTIMIZATION SYSTEM FOR TPSSYM =
                                                                                                                       2
  TOTAL NUMBER OF DESIGN VARIABLES =
                                                                                  48
  TOTAL NUMBER OF CONSTRAINS = 2304
TOTAL NUMBER OF TEMP. CONSTRAINS = 1920
   TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
        X 0.2284E+04
      1.0 B B B B B B
                                                              B B B B B B
                                                                                                                                                                                            A B B B B
              D D D D D D D
                                                                    \begin{picture}(100,0) \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){100}} \put(0,0){\line(0,0){1
      0.0
                                                                                                                                                    -1.0
              . 03
                                        .13
                                                              .23 .33
                                                                                                        .43 .53 .63
TIME ( X 5.605E-44 )
                                                                                                                                                                                                     .73
                                                                                                                                                                                                                              .83
                                                                                                                                                                                                                                                         .93
                                                                                                                                                                                                                                                                              1.03
                               MAXIMUM TEMPERATURE OF EVERY LAYER
                1 2 3 4
2300.33 2700.33 550.33 600.33
LAYER:
Tmax:
                2283.92 2283.92
                                                        483.58
Optv:
                                                                           483.58
                                        VALUES OF DESIGN VARIABLES :
LAYER
                   DEV01
                                      DEV02 DEV03 DEV04 DEV05
                                                                                                                    DEV/06
                                                                                                                                        DEV07
                                                                                                                                                            DEV08
                                                                                                                                                                               DEW09
                                                                                                                                                                                                  DEV10
                                                                                                                                                                                                                      DEV11
                                                                                                                                                                                                                                          DEV12
       1 0.73781 0.69224 0.57214 0.46749
                                                                                           0.39408
                                                                                                              0.29810 0.44762 0.33980
                                                                                                                                                                         0.01026
                                                                                                                                                                                              0.01000
                                                                                                                                                                                                                  0.31320
                                                                                                                                                                                                                                     0.35115
        2 3.24830 3.30871 2.06826
3 0.00100 0.39754 0.15027
                                                                       1.90442
                                                                                           2.52073
0.22097
                                                                                                               2.84569
0.07041
                                                                                                                                  2.74102 2.98440
0.02557 0.01738
                                                                                                                                                                         1.50063
                                                                                                                                                                                              1.34451
                                                                                                                                                                                                                  1.31592
                                                                                                                                                                                                                                     1.26102
                                                                                                                                                                          0.03615
                                                                                                                                                                                              0.31394
                                                                                                                                                                                                                  0.48671
                                                                                                                                                                                                                                      0 04101
         4 \quad 0.05000 \quad 0.99874 \quad 1.19830 \quad 0.06620 \quad 0.17348 \quad 0.07686 \quad 0.09637 \quad 0.19394 \quad 0.21222 \quad 0.07586 \quad 0.08690 \quad 0.05000 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08600 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 0.08690 \quad 
 THE ORIGINAL OBJECTIVE FUNCTION =
                                                                               373.1199036
 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.4369892
 THE TOTAL OPTIMAL WEIGHT = 2.68273188E+05
```

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1543E+01
       1 0 +
  0.0
 -1.0 +
      0.2
                 .12
                           .22 .32
                                                               5.2
                                                                                      .72
                                                                                                  .82
                                                                                                             .92
                                                                                                                      1 02
                                                       TIME ( X 8.408E-44 )
            OPTIMAL STRUCTURES OF TPS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
_____
                     HRSI COAT
                                         thin skin
                                                             0.38616 in. 2283.9 F
_____
                                                             2.25364 in. 2283.9 F
                                                             i
                     RTV-560
                                        thin skin
                                                            0.14783 in. 483.6 F
                                         ------
                                                            0.27324 in. 483.6 F
                     17 LB SIP .16 IN
_____
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                             LAYER02
                                                LAYER03
                                                                   LAYER04
  PANEL
        LAYER01
          0.64710
                   2269.82 2.93327
                                      2269.82
                                                0.38086
                                                           550.33
                                                                             119.15
      6
          0 69224
                   2283.92
                            3 30871
                                      2283 92
                                                0 39754
                                                           550 33
                                                                   0 99874
                                                                             101 07
          0.72051
                   2250.00
                            3.40285
                                      2250.00
                                                0.27054
                                                           404.65
                                                                   0.61112
                             3.24830
2.78215
                                                0.00100
0.35595
                                                           550.33
550.33
          0 73781
                   2282.83
                                      2282.83
                                                                   0.05000
                                                                             111.89
          0.53735
                   2210.20
                                      2210.20
                                                                   0.65145
                                                                              101.07
          0 55314
                   2176 90
                             2 70922
                                      2176 90
                                                0.38282
                                                           111.35
                                                                   0.57377
                                                                              111 35
                   2266.99
                             2.53616
                                                           550.33
     11
          0.56650
                                      2266.99
                                                0.26547
                                                                   0.36113
                                                                              194.55
          0.58133
                    2281.52
                             2.30041
                                       2281.52
                                                0.02090
                                                           550.33
                                                                   0.05000
                                                                              302.83
     13
          0.43711
                   2241.18
                             2.72121
                                      2241.18
                                                0.28968
                                                           167.38
                                                                   0.31947
                                                                             167.38
          0.45580
                   2240.97
                            2.48400
                                      2240.97
                                                0.31572
                                                           550.33
                                                                   0.30841
                                                                              118.90
     15
          0 47541
                   2263.76
                            2.20021
                                      2263 76
                                                0 22113
                                                           550 33
                                                                   0 21412
                                                                             227 59
                    2273.21
                                       2273.21
                                                0.02181
                                                           550.33
                                                                   0.05617
                                                                              378.17
          0.49833
                             1.90030
     16
                             2.71495
          0.35190
                    2235.93
                                       2235.93
                                                0.20358
                                                           550.33
                                                                   0.15783
                                                                              101.07
                   2261.53
2269.74
     18
          0.39408
                             2.52073
                                      2261.53
                                                0.22097
                                                           550.33
                                                                   0.17349
                                                                              115.91
          0.43195
                             2.25113
                                       2269.74
                                                0.15540
                                                           550.33
     2.0
          0.46749
                    2260.01
                             1.90442
                                      2260.01
                                                0.01304
                                                           550.33
                                                                   0.06620
                                                                              366.29
                    2274.90
                             2.71157
          0.28556
                                      2274.90
                                                0.11811
                                                           550.33
                                                                   0.11798
                                                                              109.83
     22
          0.35949
                   2283.92
                             2.69799
                                      2283.92
                                                0.12304
                                                           550.33
                                                                   0.13298
                                                                             110.50
     23
                                      2276.38
          0.41999
                    2276.38
                             2.50887
                                                0.08266
                                                           550.33
                                                                   0.11901
                                                                              175.34
     24
          0.46471
                    1625.84
                             2.15193
                                      1625.84
                                                0.00428
                                                           483.58
                                                                   0.07778
                                                                              483.58
          0.24057
     25
                   2196.44
                             2.67382
                                      2196.44
                                                0.05076
                                                           255.04
                                                                   0.15281
                                                                             255.04
          0.34403
                    2283.92
                             2.89356
                                       2283.92
                                                0.04676
                                                           550.33
     27
          0 42011
                   1835 40
                             2 83046
                                      1835 40
                                                0.03048
                                                          199 89
                                                                   0 13046
                                                                             199 89
                    2227.27
          0.46610
                             2.48508
                                      2227.27
                                                0.00522
                                                           550.33
                                                                   0.08865
     29
30
                             2.55384
2.98440
                                      2280.48
2280.45
                                                0.02200
0.01738
                                                                   0.21489
0.19394
          0.22058
                   2280.48
                                                           550.33
                                                                              200.64
          0.33980
                                                           550.33
                    2280.45
                                                                              109.92
                                                                   0.15476
     31
          0.41533
                    2257.10
                             3.04562
                                       2257.10
                                                0.01867
                                                           550.33
     32
          0.44762
                    2212.00
                             2.74102
                                      2212.00
                                                0.02557
                                                           550.33
                                                                   0.09637
                                                                              124.24
          0.23291
                                      2198.58
                                                0.05026
                                                           550.33
                                                                   0.25735
                                                                              241.65
     34
          0.33883
                   2212.63
                             2.84898
                                      2212.63
                                                0.05982
                                                           550.33
                                                                   0.22357
                                                                             122.99
     35
          0.38974
                    2212.17
                             2.99198
                                      2212.17
                                                0.06916
                                                           550.33
                                                                   0.17045
                                                                              101.07
     36
          0.38512
                   2200.25
                             2.76058
                                      2200.25
                                                0.07518
                                                           550.33
                                                                   0.09866
                                                                             101.07
                                      2026.98
                                                0.15567
     37
          0.27873
                    2026.98
                             1.93446
                                                           550.33
                                                                   0.23213
                                                                              270.64
          0.33325
                    2077.41
                             2.36529
                                       2077.41
                                                0.19926
                                                           550.33
                                                                   0.20429
     39
          0.32489
                   2131.64
                             2.50799
                                      2131.64
                                                0.20442
                                                           550.33
                                                                   0.15709
                                                                             101.07
                             2.38142
                                       2194.18
                                                0.16387
     61
          0 11692
                   1979 40
                             1.00072
                                      1979 40
                                                0.03542
                                                           550 33
                                                                   0 24485
                                                                              483 58
                             1.13103
                                                0.03366
                                                           550.33
     62
          0.01823
                    2166.54
                                      2166.54
                                                                   0.27243
                                                                              483.58
                             1.50063
1.98858
     63
          0.01026
                   2250.00
                                      2250.00
                                                0.03615
                                                           550.33
                                                                   0.21222
                                                                             404.65
                    2259.70
                                      2259.70
                                                0.04292
                                                           550.33
                                                                   0.12151
     64
          0.06953
                                                                              302.40
          0.17323
                    2225.39
                             2.47685
                                      2225.39
                                                0.05426
                                                           550.33
                                                                   0.05735
                                                                              197.64
     66
          0.29810
                    2176.90
                             2.84569
                                      2176.90
                                                0.07041
                                                           550.33
                                                                   0.07686
                                                                             111.35
     67
                    2143.85
                             2.97782
                                                           550.33
                                                                              101.07
          0.42138
                                       2143.85
                                                0.09164
                                                                   0.23659
     68
          0.52054
                    2155.83
                             2.75475
                                      2155.83
                                                0.11832
                                                           550.33
                                                                   0.59429
                                                                              101.07
          0.57214
                    2241.18
                             2.06826
                                       2241.18
                                                0.15027
                                                           550.33
                                                                   1.19830
     69
                                                                              167.38
     71
          0.19410
                    1995.47
                             1.42465
                                       1995.47
                                                0.09110
                                                           550.33
                                                                   0.24262
                                                                              407.57
     72
          0.11377
                    2180.79
                                      2180.79
                                                           550.33
                                                                   0.27028
                                                                              376.33
                             1.67209
                                                0.04053
                                                                   0.21734
                             1.98072
                                                0.02946
          0.14054
                   2279.39
                             2.30420
                                      2279.39
                                                0.04787
                                                           550.33
                                                                   0.13840
                                                                             233.26
```

```
75
          0.21833
                   2249.25
                             2.59752
                                       2249.25
                                                 0.08683
                                                           550.33
                                                                    0.08649
                                                                               152.55
     76
          0.31866
                    2203.63
                             2.80772
                                       2203.63
                                                 0.13731
                                                            550.33
                                                                    0.11640
                                                                               101.07
     77
          0.42584
                    2170.55
                             2.88664
                                       2170.55
                                                 0.18964
                                                           550.33
                                                                    0 28049
                                                                               101 07
     78
                    2177.80
                                       2177.80
          0.52637
                             2.78515
                                                            550.33
                                                 0.23514
                                                                    0.63568
                                                                               101.07
                             2.46700
1.27531
     79
          0.60444
                    2253.67
                                       2253.67
                                                 0.26919
                                                            550.33
                                                                    1.22912
                                                                               144.51
          0.37034
                                                 0.19848
                    1654.53
                                       1654.53
                                                                    0.06270
                                                                               388.97
     365
                                                            550.33
     377
          0.35115
                    1625.84
                              1.26102
                                       1625.84
                                                 0.04101
                                                            550.33
                                                                    0.05000
     413
          0.01000
                    2196.44
                             1.34451
                                       2196.44
                                                 0.31394
                                                           550.33
                                                                    0.07586
                                                                               255.04
     425
          0.19468
                    1993.78
                             1.33249
                                       1993.78
                                                 0.46823
                                                            550.33
                                                                    0.08660
     437
          0.31320
                    1835.40
                             1.31592
                                       1835.40
                                                 0.48671
                                                            550.33
                                                                    0.08690
                                                                               199.89
                                                                    0.07707
                                                0.37374
          0.36931
                             1.29472
                                                           550.33
     449
                   1717.61
                                       1717.61
                                                                               279.81
                   OPTIMIZATION SYSTEM FOR TPSSYM = 30
TOTAL NUMBER OF DESIGN VARIABLES = 45
TOTAL NUMBER OF CONSTRAINS = 2745
 TOTAL NUMBER OF TEMP. CONSTRAINS = 585
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
 WARNING: MODIFICATION EXEEDS ALLOWED VALUE
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  Х (
       0.2036E+04
                В
                         В
                C
                         C
                                   C
                                             C
                                                                                                       C
                                                                                                                В
                                                      E
                                                                E
                                                                          Ε
                                                                                   E
                                                                                             E
  0.0
  -1.0
       0.8
                  .18
                             .28
                                         .38
                                                     .48
                                                                .58
                                                                                       .78
                                                                                                   .88
                                                                                                               9.8
                                                                                                                        1.08
                                                          TIME ( X 1.401E-44 )
              MAXIMUM TEMPERATURE OF EVERY LAYER
       1 2 3 4
2800.33 2900.33 2700.33 550.33
2036.22 2036.22 1726.37 548.47
                                     4
LAYER:
Tmax:
                                          548.47
Optv:
                  VALUES OF DESIGN VARIABLES :
EV02 DEV03 DEV04 DEV
        DEV01
                DEV02
                                          DEV05
                                                   DEV06
                                                            DEV07
                                                                     DEV08
                                                                              DEV09
LAYER
                       0.01000
                                0.01000
                                         0.01000 0.01000
      0.01000
              0.01000
                                                          0.01000
                                                                   0.01000
                                                                            0.01000
      0.01000
               0.01000
                       0.01000 0.01000
1.00000 1.00000
                                         0.01000
                                                  0.01000
                                                          0.01000
                                                                   0.01000
                                                                            0.01000
               1.00000
                                         1.23009
                                                  1.00000
                                                          1.00000
      1.00000
                                                                   1.22957
                                                                            1.03625
      0.00567
                                                                            0.05000
THE ORIGINAL OBJECTIVE FUNCTION = 4793.1660156
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0 1337998
 THE TOTAL OPTIMAL WEIGHT = 7.82763492E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X
1.0 +
      0.4258E+01
                                                                   A AA AA AA A
                                                                                 A A A A AA AA AA AA AA AA AA AA AA AA
                                                                              A AA A
                                                                                     A A A A
```

```
-1.0 +
                                  .31 .41 .51 .61
TIME ( X 2.242E-43 )
               .11
                           .21
                                                                                         .71
                                                                                                     .81
                                                                                                                 .91
                                                                                                                           1 01
            OPTIMAL STRUCTURES OF TPS FOR PATCH = 30
(WITH AVERAGE THICKNESS)

ACC((N) thin skin
                                                              0.01000 in. 2036.2 F
_____
0.03000 in. ZIRCONIUM
                                          radiation gap
                                                              0.01000 in. 2036.2 F
       0.03000 in. ZIRCONIUM
1.05510 in. 1726.4 F
                     LI-2200 (N)
                   RTV-560 thin skin
_____
                     17 LB SIP .16 IN
                                                              0.06728 in. 548.5 F
-----
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                           3.0
                             LAYER02
                                                                     LAYER04
                                                                                         LAYER05
 PANEL
         LAYER01
                                                 LAYER03
                   1331.94 0.01000
                                       1331.94
                                                           1148.83
                                                                                550.33
                                                                                                     494.78
 10421
         0.01000
                                                 1.00000
                                                                     0.01207
                                                                                         0.07882
                   1151.03
         0.01000
                             0.01000
                                       1151.03
                                                 1.00000
                                                            952.80
                                                                                 550.33
                   1439.15
1720.21
 10001
         0.01000
                             0.01000
                                       1439.15
                                                 1.03625
                                                           1247 46
                                                                     0.00567
                                                                                 550 33
                                                                                         0.05000
                                                                                                     548 47
                             0.01000
                                       1720.21
                                                 1.12926
                                                                     0.04300
  10002
         0.01000
                                                            1543.17
                                                                                 550.33
                                                                                         0.05000
                                                                                                     496.02
 10003
         0.01000
                   1839.35
                             0.01000
                                       1839.35
                                                 1 16953
                                                           1668.55
                                                                     0.05936
                                                                                 550.33
                                                                                         0.05000
                                                                                                     469 95
  10004
         0.01000
                   1929.36
                            0.01000
                                       1929.36
                                                 1.20086
                                                           1763.29
                                                                     0.07228
                                                                                 550.33
                                                                                         0.05000
                                                                                                     446.09
 10005
         0.01000
                   1982.15
                             0.01000
                                       1982.15
                                                 1.22049
                                                           1818.90
                                                                     0.08064
                                                                                 550.33
                                                                                         0.05000
                                                                                                     426.43
 10006
         0.01000
                   2001.18
                             0.01000
                                       2001.18
                                                 1.22957
                                                           1839.00
                                                                     0.08491
                                                                                 550.33
                                                                                         0.05000
                                                                                                     410.21
                   1988.07
  10007
         0.01000
                             0.01000
                                       1988.07
                                                 1.22858
                                                            1825.34
                                                                     0.08504
                                                                                 550.33
                                                                                         0.05061
                                                                                                     397.43
 10008
         0.01000
                   1940.61
                             0.01000
0.01000
                                       1940.61
1872.66
                                                 1.21691
                                                           1775.56
                                                                     0.08103
                                                                                 550.33
                                                                                         0.05119
                                                                                                     387.98
                   1872.66
                                                            1704.19
                                                                     0.07445
                                                                                         0.05128
  10009
         0.01000
                                                 1.19842
                                                                                 550.33
                                                                                                     382.56
  10010
         0.01000
                   1798.40
                             0.01000
                                       1798.40
                                                 1.17749
                                                            1626.16
                                                                     0.06697
                                                                                 550.33
                                                                                         0.05098
                                                                                                     379.88
         0.01000
                   1708.02
                             0.01000
                                       1708.02
                                                 1.15152
                                                            1531.18
                                                                     0.05753
                                                                                         0.05070
                                                                                                     378.83
  10011
                                                                                 550.33
  10012
         0.01000
                   1601.67
                             0.01000
                                       1601.67
                                                 1.12056
                                                            1419.40
                                                                     0.04615
                                                                                 550.33
                                                                                         0.05043
                                                                                                     379.42
 10013
         0.01000
                   1479 46
                             0.01000
                                       1479 46
                                                 1 08463
                                                           1290 95
                                                                     0 03283
                                                                                 550 33
                                                                                         0.05022
                                                                                                     381 65
                   1341.54
                                                                                 550.33
  10014
         0.01000
                             0.01000
                                       1341.54
                                                 1.04378
                                                            1145.98
                                                                     0.01757
                                                                                         0.05006
                                                                                                     385.53
                             0.01000
0.01000
 10015
         0.01000
                   1194.63
                                       1194.63
                                                 1 00000
                                                            991.54
                                                                     0 00111
                                                                                 550 33
                                                                                         0.05000
                                                                                                     390 83
  10016
         0.01000
                   1419.17
                                       1419.17
                                                 1.02784
                                                            1227.00
                                                                     0.00521
                                                                                 550.33
                                                                                         0.05508
                                                                                                     547.43
 10017
         0 01000
                   1731.43
                             0.01000
                                       1731.43
                                                 1 12986
                                                            1555 62
                                                                     0 04146
                                                                                 550.33
                                                                                         0 06253
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10123	0.01000	1743.05	0.01000	1743.05	1.12704	1574.61	0.03934	550.33	0.11514	476.59
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10124	0.01000	1830.98	0.01000	1830.98	1.15791		0 04705		0 10001	AEE OO
10125	0.01000	1884.77	0.01000		1 10000	1667.21	0.04785	550.33	0.12331	455.90
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10129	0.01000 0.01000	1891.36 1844.25	0.01000 0.01000 0.01000	1904.75 1891.36 1844.25	1.18960 1.19073 1.18196	1723.86 1744.90 1730.78 1681.15	0.05354 0.05643 0.05656 0.05388	550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272	437.22 420.53 405.63 392.74
	0.01000 0.01000 0.01000	1891.36 1844.25 1778.92	0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92	1.18960 1.19073 1.18196 1.16702	1723.86 1744.90 1730.78 1681.15 1612.32	0.05354 0.05643 0.05656 0.05388 0.04949	550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583	437.22 420.53 405.63 392.74 383.48
	0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04	0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04	1.18960 1.19073 1.18196 1.16702 1.14994	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450	550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856	437.22 420.53 405.63 392.74 383.48 377.05
10131	0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825	550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975	437.22 420.53 405.63 392.74 383.48 377.05 371.57
	0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04	0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86	1.18960 1.19073 1.18196 1.16702 1.14994	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450	550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856	437.22 420.53 405.63 392.74 383.48 377.05
10131 10132	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03
10131 10132 10133	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44
10131 10132 10133 10134	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78
10131 10132 10133 10134 10135	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78
10131 10132 10133 10134 10135 10136	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 541.15
10131 10132 10133 10134 10135	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78
10131 10132 10133 10134 10135 10136	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 541.15
10131 10132 10133 10134 10135 10136 10137 10138	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.077210 1.03739 1.00000 0.99443 1.07736 1.10774	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1508.78	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 541.15 497.09 473.54
10131 10132 10133 10134 10135 10136 10137 10138 10139	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.07236 1.10774 1.13439	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78 1586.46	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11986	437.22 420.53 405.63 392.74 383.48 377.05 367.03 363.44 361.78 361.78 541.15 497.09 473.54 452.24
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.07736 1.10774 1.13439 1.15238	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04379 0.04901	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11986	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 4361.78 361.78 361.78 497.09 473.54 452.24 433.15
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.07210 1.03739 1.00000 0.99443 1.0774 1.13439 1.15238 1.16178	1723.86 1744.90 1730.78 1681.15 1612.32 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78 1586.46	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04379 0.04379 0.04379 0.04379	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11986 0.12402 0.12511	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 541.15 497.09 473.54 452.24 433.15
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.07736 1.10774 1.13439 1.15238	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04379 0.04901	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11986	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 4361.78 361.78 361.78 497.09 473.54 452.24 433.15
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.07210 1.03739 1.00000 0.99443 1.0774 1.13439 1.15238 1.16178	1723.86 1744.90 1730.78 1681.15 1612.32 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78 1586.46	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04379 0.04379 0.04379 0.04379	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11986 0.12402 0.12511	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 541.15 497.09 473.54 452.24 433.15
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1799.58	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.077236 1.10774 1.13439 1.15238 1.16178 1.16282 1.15536	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04901 0.05167 0.05180	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.1811	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 4361.78 361.78 361.78 497.09 473.54 452.24 433.15 416.24 401.33 388.64
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.07210 1.03739 1.00000 0.99443 1.0774 1.13439 1.15238 1.16178 1.16282 1.15536 1.14262	1723.86 1744.90 1730.78 1681.15 1612.32 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1508.78 1586.46 1633.02 1648.70 1634.09	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04379 0.04379 0.05167 0.05180 0.05180 0.04535	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05500 0.07815 0.10224 0.11261 0.11986 0.12402 0.12511 0.12315 0.1811 0.11811	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 541.15 497.09 473.54 452.24 401.33 388.64 379.71
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143 10144	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1795.57 1697.55 1635.88	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.07236 1.10774 1.13439 1.16282 1.15536 1.14262 1.12803	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84 1586.46 1632.57.50	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04379 0.04901 0.05167 0.05167 0.05180 0.04937 0.04935 0.04935	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.11811 0.11153 0.10464	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 361.78 341.15 497.09 473.54 452.24 433.15 416.24 401.33 388.64 379.71 373.65
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10144 10142 10143 10144 10144 10144 10144	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1797.43 1812.38 1755.71 1697.55	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.0774 1.13439 1.16178 1.16282 1.15536 1.14262 1.12803 1.19963	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1598.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1462.46	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04901 0.05167 0.05167 0.05167 0.04937 0.04937 0.04935 0.04937	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.1811 0.11153 0.10464 0.09635	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 4361.78 361.78 361.78 497.09 473.54 452.24 433.15 416.24 401.33 388.64 379.71 373.65 368.62
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143 10144 10145 10146	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1798.58 1697.55 1635.88	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1795.71 1697.55 1635.88 1561.19 1473.58	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.07210 0.99443 1.07236 1.10774 1.13439 1.15238 1.16178 1.16282 1.15536 1.14262 1.12803 1.1963 1.09746	1723.86 1744.90 1730.78 1681.15 1612.32 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1462.46 1383.71 1291.34	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.02193 0.01189 0.00107 0.00250 0.02556 0.02556 0.03598 0.04379 0.04379 0.04379 0.05167 0.05180 0.04535 0.04937	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06500 0.07815 0.10224 0.11261 0.11286 0.12402 0.12511 0.12315 0.11153 0.10464 0.09635 0.08668	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 541.15 497.09 473.54 452.24 401.33 388.64 379.71 373.65 368.62 364.64
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10144 10142 10143 10144 10144 10144 10144	0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1797.43 1812.38 1755.71 1697.55	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.0774 1.13439 1.16178 1.16282 1.15536 1.14262 1.12803 1.19963	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1598.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1462.46	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04901 0.05167 0.05167 0.05167 0.04937 0.04937 0.04935 0.04937	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.1811 0.11153 0.10464 0.09635	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 4361.78 361.78 361.78 497.09 473.54 452.24 433.15 416.24 401.33 388.64 379.71 373.65 368.62
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143 10144 10145 10146 10147 10148	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1561.19	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1561.19 1473.58 1373.15	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.07236 1.10774 1.13439 1.15238 1.16178 1.16282 1.15536 1.14262 1.12803 1.10963 1.08746 1.06155	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1462.46 1383.71 1291.34 1185.46	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04379 0.05167 0.05167 0.05167 0.05180 0.04937 0.04535 0.04938 0.04535 0.04535 0.02819	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.11811 0.1153 0.10464 0.09635 0.08668 0.07563	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 361.78 497.09 473.54 452.24 433.15 416.24 401.33 388.64 401.33 388.64 379.71 373.65 368.62 364.64 361.78
10131 10132 10133 10134 10135 10136 10137 10138 10140 10141 10142 10143 10144 10145 10146 10147 10148	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1798.58 1755.71 1697.55 1635.88 1743.58	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1798.58 1755.71 1697.55 1635.88 1561.19 1473.58 1373.15 1259.99	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.07210 1.03739 1.00000 0.99443 1.0774 1.13439 1.15238 1.16178 1.16282 1.15536 1.14262 1.12803 1.09746 1.08746 1.08746 1.06155	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1462.46 1383.71 1291.34 185.46 1066.16	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04901 0.05167 0.05167 0.05167 0.05180 0.04937 0.04935 0.04937 0.04535 0.04937 0.02819 0.02819 0.02819 0.02015 0.02015	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.1811 0.11153 0.06688 0.07563 0.08668 0.07563 0.07563	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 361.78 497.09 473.54 497.09 473.54 401.33 388.64 379.71 373.65 368.62 364.64 361.78
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143 10144 10145 10146 10147 10148	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1751.71 1697.55 1635.88 1751.71	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1753.17 1797.43 1812.38 1798.58 1798.58 1755.71 1697.55 1635.88 1755.71 1697.55 1635.88 1755.71 1697.55 1635.88 1755.99 1473.58	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.07210 0.99443 1.07236 1.10774 1.13439 1.15238 1.16178 1.16282 1.15536 1.14262 1.12803 1.0963 1.08746 1.06155 1.03191 1.00000	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1462.46 038.371 1291.34 1185.46	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.0372 0.02193 0.00107 0.00250 0.02556 0.03598 0.04379 0.05180 0.04937 0.04937 0.04937 0.04937 0.04937 0.04938 0.04937 0.04938 0.04937 0.04938 0.04937 0.04938 0.04937 0.04938 0.04937 0.04938 0.04937 0.04938	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.10464 0.09635 0.08668 0.07563 0.06321 0.05000	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 541.15 497.09 473.54 452.24 433.15 416.24 401.33 388.64 379.71 373.65 368.62 364.64 361.78 361.78
10131 10132 10133 10134 10135 10136 10137 10138 10140 10141 10142 10143 10144 10145 10146 10147 10148 10149 10151	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1561.19 1473.58 1373.15 1259.99 1145.17 1338.02	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1755.71 1697.55 1635.88 1561.19 1473.58 1373.15 1259.99 1139.52 1338.02	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.07210 1.03739 1.00000 0.99443 1.16178 1.16282 1.15536 1.14262 1.12803 1.0963 1.0974 1.0963 1.0974 1.0963 1.0974 1.0963 1.0964 1.06155 1.03191 1.00000 0.99443	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1634.09 1588.84 1527.50 1462.46 1383.71 1291.34 1066.16 1066.16 139.16	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04379 0.04901 0.05167 0.05167 0.05180 0.04937 0.04935 0.0493	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12722 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.11811 0.1153 0.10464 0.09635 0.08668 0.07563 0.06321 0.05000 0.07887	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 541.15 497.09 473.54 452.24 433.15 416.24 401.33 388.64 401.33 388.64 379.71 373.65 368.62 364.64 361.78 361.78 361.78
10131 10132 10133 10134 10135 10136 10137 10138 10140 10141 10142 10143 10144 10145 10146 10147 10148 10149 10150 10150	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1798.58 1755.71 1697.55 1635.88 1747.58 1757.99 1473.58 1373.15 1259.99 1145.17 1338.02 1523.90	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1373.15 1259.99 1139.52	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.007210 1.03739 1.00000 0.99443 1.0774 1.13439 1.15238 1.16178 1.16282 1.15536 1.14262 1.12803 1.09746 1.08746 1.06155 1.03191 1.00000 0.99443	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1462.46 1383.71 1291.34 185.46 1066.16 939.16	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04901 0.05167 0.05167 0.05180 0.04937 0.04937 0.04935 0.04937 0.02819 0.02819 0.02015 0.02015 0.01096 0.00106 0.00228 0.002304	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12772 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.11811 0.11153 0.066868 0.07563 0.06321 0.05000 0.07887 0.09908	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 361.78 341.15 497.09 473.54 401.33 388.64 379.71 373.65 368.62 364.64 361.78 361.78 361.78 361.78 361.78
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143 10144 10145 10146 10147 10148 10149 10150 10151	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1751.71 1697.55 1635.88 1751.71 1697.55 1635.88 1751.71 1697.55 1635.88	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1378.59 1473.58 1373.15 1259.99 1139.52 1338.02 1523.90 1604.38	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.07210 0.99443 1.07236 1.10774 1.13439 1.15238 1.16178 1.15238 1.16282 1.15536 1.14262 1.12803 1.0963 1.08746 1.06155 1.03191 1.00000 0.99443 1.00000 0.99443	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1399.74 1508.78 1586.46 1633.02 1634.09 1588.84 1527.50 1462.46 1383.71 1291.34 1185.46 1066.16 939.16 1150.76	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.00107 0.00250 0.02556 0.03598 0.04379 0.05180 0.04937 0.04937 0.04937 0.04935 0.04937 0.04935 0.04937 0.05180 0.03508	550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11286 0.12402 0.12511 0.12315 0.10464 0.09635 0.09635 0.06321 0.07563 0.06321 0.05000 0.07887 0.09908 0.07770	437.22 420.53 405.63 392.74 383.48 377.05 367.03 363.44 361.78 541.15 497.09 473.54 452.24 433.15 416.24 401.33 388.64 379.71 373.65 368.62 364.64 361.78 361.78 361.78
10131 10132 10133 10134 10135 10136 10137 10138 10140 10141 10142 10143 10144 10145 10146 10147 10148 10149 10150 10151 10152 10152	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1798.58 1755.71 1697.55 1635.88 1747.58 1757.99 1473.58 1373.15 1259.99 1145.17 1338.02 1523.90	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1373.15 1259.99 1139.52	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.10245 1.007210 1.03739 1.00000 0.99443 1.0774 1.13439 1.15238 1.16178 1.16282 1.15536 1.14262 1.12803 1.09746 1.08746 1.06155 1.03191 1.00000 0.99443	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1508.78 1586.46 1633.02 1648.70 1634.09 1588.84 1527.50 1462.46 1383.71 1291.34 185.46 1066.16 939.16	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.01189 0.00107 0.00250 0.02556 0.03598 0.04901 0.05167 0.05167 0.05180 0.04937 0.04937 0.04935 0.04937 0.02819 0.02819 0.02015 0.02015 0.01096 0.00106 0.00228 0.002304	550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33 550.33	0.12813 0.12965 0.12786 0.12772 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11261 0.12402 0.12511 0.12315 0.11811 0.11153 0.066868 0.07563 0.06321 0.05000 0.07887 0.09908	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 361.78 361.78 341.15 497.09 473.54 401.33 388.64 379.71 373.65 368.62 364.64 361.78 361.78 361.78 361.78 361.78
10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143 10144 10145 10146 10147 10148 10149 10150 10151	0.01000 0.01000	1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1145.17 1338.37 1575.80 1679.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1751.71 1697.55 1635.88 1751.71 1697.55 1635.88 1751.71 1697.55 1635.88	0.01000 0.01000	1904.75 1891.36 1844.25 1778.92 1709.04 1623.99 1523.86 1408.77 1278.81 1140.18 1338.37 1753.17 1797.43 1812.38 1798.58 1755.71 1697.55 1635.88 1378.59 1473.58 1373.15 1259.99 1139.52 1338.02 1523.90 1604.38	1.18960 1.19073 1.18196 1.16702 1.14994 1.12840 1.0245 1.07210 0.99443 1.07236 1.10774 1.13439 1.15238 1.16178 1.15238 1.16282 1.15536 1.14262 1.12803 1.0963 1.08746 1.06155 1.03191 1.00000 0.99443 1.00000 0.99443	1723.86 1744.90 1730.78 1681.15 1612.32 1538.71 1449.11 1343.62 1222.37 1085.45 939.41 1149.74 1399.74 1399.74 1508.78 1586.46 1633.02 1634.09 1588.84 1527.50 1462.46 1383.71 1291.34 1185.46 1066.16 939.16 1150.76	0.05354 0.05643 0.05656 0.05388 0.04949 0.04450 0.03825 0.03072 0.02193 0.00107 0.00250 0.02556 0.03598 0.04379 0.05180 0.04937 0.04937 0.04937 0.04935 0.04937 0.04935 0.04937 0.05180 0.03508	550.33 550.33	0.12813 0.12965 0.12786 0.12272 0.11583 0.10856 0.09975 0.08942 0.07758 0.06423 0.05000 0.07815 0.10224 0.11261 0.11286 0.12402 0.12511 0.12315 0.10464 0.09635 0.09635 0.06321 0.07563 0.06321 0.05000 0.07887 0.09908 0.07770	437.22 420.53 405.63 392.74 383.48 377.05 371.57 367.03 363.44 361.78 541.15 497.09 473.54 452.24 433.15 416.24 401.33 388.64 379.71 373.65 368.62 364.64 361.78 361.78 361.78

10156	0.01000	1702.26	0.01000	1702.26	1.12891	1533.85	0.04664	550.33	0.11738	410.71
10157	0.01000	1688.00	0.01000	1688.00	1.12980	1518.67	0.04678	550.33	0.11530	395.86
10158	0.01000	1650.34	0.01000	1650.34	1.12388	1478.82	0.04459	550.33	0.11056	383.50
10159	0.01000	1600.90	0.01000	1600.90	1.11372	1426.58	0.04098	550.33	0.10455	375.08
10160	0.01000	1549.17	0.01000	1549.17	1.10208	1371.95	0.03688	550.33	0.09834	369.57
10161	0.01000	1487.01	0.01000	1487.01	1.08741	1306.31	0.03173	550.33	0.09094	365.23
10162	0.01000	1414.49	0.01000	1414.49	1.06973	1229.77	0.02552	550.33	0.08234	362.07
10163	0.01000	1331.72	0.01000	1331.72	1.04906	1142.40	0.01827	550.33	0.07256	361.78
10164	0.01000	1238.77	0.01000	1238.77	1.02543	1044.31	0.00998	550.33	0.06161	361.78
10165	0.01000	1145.17	0.01000	1140.08	1.00000	940.16	0.00105	550.33	0.05000	361.78
10166	0.01000	1339.83	0.01000	1339.83	0.99536	1154.15	0.00208	550.33	0.07911	540.13
10167	0.01000	1465.03	0.01000	1465.03	1.03972	1285.84	0.02041	550.33	0.09414	490.80
10168	0.01000	1518.16	0.01000	1518.16	1.06001	1341.66	0.02874	550.33	0.10041	464.80
10169	0.01000	1554.07	0.01000	1554.07	1.07531	1379.32	0.03500	550.33	0.10455	441.68
10170	0.01000	1572.78	0.01000	1572.78	1.08563	1398.85	0.03920	550.33	0.10657	421.41
10171	0.01000	1574.38	0.01000	1574.38	1.09099	1400.32	0.04134	550.33	0.10647	403.95
10172	0.01000	1559.62	0.01000	1559.62	1.09166	1384.53	0.04148	550.33	0.10431	389.21
10173	0.01000 0.01000	1528.12 1488.95	0.01000 0.01000	1528.12 1488.95	1.08749 1.08032	1351.07	0.03956	550.33 550.33	0.10006 0.09490	377.34 369.60
10174 10175	0.01000	1488.95	0.01000	1488.95	1.08032	1309.56	0.03637 0.03275	550.33	0.09490	
10175	0.01000	1448.91	0.01000	1448.91	1.07210	1267.17 1216.93	0.03275	550.33	0.08350	364.83 361.78
10176	0.01000	1346.61	0.01000	1346.61	1.04924	1158.92	0.02820	550.33	0.07641	361.78
10177	0.01000	1284.50	0.01000	1284.50	1.03464	1093.22	0.01629	550.33	0.06838	361.78
10179	0.01000	1215.15	0.01000	1215.15	1.01796	1019.90	0.00895	550.33	0.05944	361.78
10180	0.01000	1145.17	0.01000	1141.86	1.00000	942.41	0.00103	550.33	0.05000	361.78
10181	0.01000	1343.82	0.01000	1343.82	0.99721	1159.91	0.00103	550.33	0.07887	539.70
10182	0.01000	1399.30	0.01000	1399.30	1.02079	1218.11	0.01767	550.33	0.08742	486.78
10183	0.01000	1420.76	0.01000	1420.76	1.03162	1240.52	0.02487	550.33	0.09076	459.12
10184	0.01000	1432.85	0.01000	1432.85	1.03978	1253.02	0.03028	550.33	0.09270	434.78
10185	0.01000	1435.53	0.01000	1435.53	1.04525	1255.58	0.03391	550.33	0.09324	413.74
10186	0.01000	1428.74	0.01000	1428.74	1.04802	1248.14	0.03578	550.33	0.09236	395.96
10187	0.01000	1413.45	0.01000	1413.45	1.04841	1231.68	0.03591	550.33	0.09018	381.40
10188	0.01000	1389.06	0.01000	1389.06	1.04622	1205.60	0.03427	550.33	0.08661	370.15
10189	0.01000	1361.73	0.01000	1361.73	1.04243	1176.46	0.03153	550.33	0.08258	363.27
10190	0.01000	1335.11	0.01000	1335.11	1.03808	1148.12	0.02841	550.33	0.07862	361.78
10191	0.01000	1304.51	0.01000	1304.51	1.03260	1115.55	0.02448	550.33	0.07405	361.78
10192	0.01000	1269.94	0.01000	1269.94	1.02600	1078.80	0.01975	550.33	0.06887	361.78
10193	0.01000	1231.47	0.01000	1231.47	1.01829	1037.91	0.01421	550.33	0.06309	361.78
10194	0.01000	1189.12	0.01000	1189.12	1.00948	992.92	0.00786	550.33	0.05670	361.78
10195	0.01000	1145.17	0.01000	1144.86	1.00000	945.91	0.00102	550.33	0.05000	363.09
10196	0.01000	1349.97	0.01000	1349.97	1.00000	1168.05	0.00175	550.33	0.07814	539.33
10197	0.01000	1326.81	0.01000	1326.81	1.00016	1143.33	0.01483	550.33	0.07894	482.20
10198	0.01000	1312.30	0.01000	1312.30	1.00025	1127.79	0.02083	550.33	0.07876	452.57
10199 10200	0.01000 0.01000	1297.27 1281.66	0.01000	1297.27 1281.66	1.00027 1.00019	1111.65 1094.86	0.02534 0.02838	550.33 550.33	0.07806 0.07684	426.80 404.87
10200	0.01000	1265.35	0.01000	1265.35	1.00019	1094.88	0.02838	550.33	0.07508	386.74
10201	0.01000	1249.47	0.01000	1249.47	1.00004	1060.10	0.02994	550.33	0.07308	372.41
10202	0.01000	1233.16	0.01000	1233.16	1.00004	1042.41	0.03007	550.33	0.07022	361.93
10203	0.01000	1219.21	0.01000	1219.21	1.00004	1042.41	0.02645	550.33	0.06759	361.78
10201	0.01000	1207.78	0.01000	1207.78	1.00003	1014.81	0.02386	550.33	0.06520	361.78
10206	0.01000	1196.20	0.01000	1196.20	1.00002	1002.19	0.02059	550.33	0.06258	361.78
10207	0.01000	1184.49	0.01000	1184.49	1.00001	989.42	0.01664	550.33	0.05974	361.78
10208	0.01000	1172.65	0.01000	1172.65	1.00000	976.47	0.01202	550.33	0.05667	361.78
10209	0.01000	1160.68	0.01000	1160.68	1.00000	963.38	0.00672	550.33	0.05338	361.78
10210	0.01000	1149.08	0.01000	1149.08	1.00000	950.66	0.00100	550.33	0.05000	365.96
10422	0.01000	1320.17	0.01000	1320.17	1.00000	1136.24	0.01746	550.33	0.07884	469.46
10423	0.01000	1310.68	0.01000	1310.68	1.00000	1126.08	0.02106	550.33	0.07864	451.13
10424	0.01000	1296.61	0.01000	1296.61	1.00000	1110.98	0.02524	550.33	0.07797	427.16
10425	0.01000	1265.35	0.01000	1265.35	1.00000	1077.28	0.02994	550.33	0.07508	386.74
10426	0.01000	1264.08	0.01000	1264.08	1.00000	1075.91	0.03000	550.33	0.07492	385.46
10427	0.01000	1248.40	0.01000	1248.40	1.00000	1058.95	0.03003	550.33	0.07275	371.70
10428	0.01000	1224.41	0.01000	1224.41	1.00000	1032.91	0.02743	550.33	0.06862	361.78
10429	0.01000	1215.44	0.01000	1215.44	1.00000	1023.16	0.02569	550.33	0.06683	361.78
10430	0.01000	1207.67	0.01000	1207.67	1.00000	1014.70	0.02385	550.33	0.06519	361.78
10431	0.01000	1196.12	0.01000	1196.12	1.00000	1002.11	0.02058	550.33	0.06257	361.78
10432	0.01000	1184.44	0.01000	1184.44	1.00000	989.36	0.01664	550.33	0.05973	361.78
10433	0.01000	1172.62	0.01000	1172.62	1.00000	976.44	0.01201	550.33	0.05667	361.78
10434	0.01000	1160.67	0.01000	1160.67	1.00000	963.37	0.00672	550.33	0.05337	361.78

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 636
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

```
.58 .68
TIME ( X 1.401E-44 )
      .08
                 .18
                           .28 .38
                                                                                     .78
                                                                                                .88
                                                                                                           .98
                                                                                                                     1.08
              MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4
Tmax: 2300.33 2300.33 550.33 600.33
Optv: 1795.44 1795.44 549.97 549.97
                  VALUES OF DESIGN VARIABLES :
LAYER
       DEV01
                DEV02 DEV03 DEV04 DEV05
                                                  DEV06
                                                          DEV07
                                                                   DEV08
                                                                            DEV09
              0.01000 0.01000 0.01000 0.01000 0.01000 0.01000
   1 0.01000
   2 2.16049
              2.27166
                       2.35272 2.11795 2.40248 2.24113 1.91584 1.99332
                                                                         2.04564
              0.01719
                       0.01761
                                0.02425
                                        0.00103
                                                 0.02301
   4 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                    89.0599976
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.6475893
THE TOTAL OPTIMAL WEIGHT = 4.91543861E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
      0.1274E+02
                                                                                               Α
                                                                                                         А
 -1.0 +
                                                   .44 .54 .04
TIME ( X 2.803E-44 )
                                  .34
      0.4
               .14
                           .24
                                                                                    .74
                                                                                           .84
                                                                                                        .94
                                                                                                                     1 04
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
-----
                                                            0.01000 in. 1795.4 F
                     HRSI COAT
                                        thin skin
                     LI-900 (P)
                                         slab
                                                            2.16680 in. 1795.4 F
                                                            0 01932 in 550 0 F
                    RTV-560
                                        thin skin
                     17 LB SIP .16 IN
                                                            0.05000 in. 550.0 F
                                         slab
_____
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                             LAYER02
  PANEL
          LAYER01
                                                LAYER03
                                                                  LAYER04
          0.01000
                   1667.01
                             2.09657
                                      1667.01
                                                0.02326
                                                          550.33
                                                                             548.83
    367
          0.01000
                   1633.98 2.14317
1605.26 2.13971
                                      1633.98
1605.26
                                               0.01533
                                                          550.33
                                                                  0.05000
                                                                             548.78
          0.01000
                                                0.01273
    369
          0.01000
                   1580.84
                            2.08461
                                      1580.84
                                                0.01559
                                                          550.33
                                                                  0.05000
                                                                             546 70
    370
                            1.97802
                                                          550.33
                                                                  0.05000
                                                                             544.66
          0.01000
                   1560.96
                                      1560.96
                                                0.02392
    378
379
                            2.04564
2.02264
                                               0.02266
0.02120
                                                          550.33
550.33
          0.01000
                   1632.28
                                      1632.28
                                                                  0.05000
                                                                             548.83
          0.01000
                   1600.21
                                      1600.21
                                                                  0.05000
                                                                             547.95
    380
          0.01000
                   1571.45
                            1.99332
                                      1571.45
                                                0.02088
                                                          550.33
                                                                   0.05000
                                                                             546.93
                            1.95774
1.91584
    381
          0.01000
                   1546.03
                                      1546.03
                                                0.02170
                                                          550.33
                                                                  0.05000
                                                                             545.78
    382
                   1523.92
                                      1523.92
                                                0.02365
                                                          550.33
                                                                   0.05000
          0.01000
                                                                             544.49
                            2.35272
    414
          0.01000
                   1795.44
1751.94
                                      1795.44
                                                0.01761
                                                          550.33
                                                                  0.05000
                                                                             549.89
          0.01000
                                      1751.94
                                                                   0.05000
    415
                                                0.01653
                                                          550.33
                                                                             549.10
    416
          0.01000
                   1716.49
                             2.27166
                                      1716.49
                                                0.01719
                                                          550.33
                                                                   0.05000
                                                                             548.37
          0.01000
                            2.21996
                                               0.01953
                                                          550.33
                                                                  0.05000
                                                                             547.71
    417
                   1689.11
                                      1689.11
                             2.16049
                   1783.01 2.30353
                                      1783.01
          0.01000
                                               0.02097
                                                          550.33
                                                                  0.05000
                                                                             549.42
```

```
427
           0.01000
                      1742.12
                                 2.39223
                                            1742.12
                                                       0.00851
                                                                   550.33
                                                                             0.05000
                                                                                         549.97
     428
            0.01000
                       1709.01
                                 2.39744
                                            1709.01
                                                       0.00483
                                                                   550.33
                                                                             0.05000
                                                                                         549.70
     429
            0.01000
                      1683.60
                                 2.31798
                                            1683.60
                                                       0.01003
                                                                   550.33
                                                                             0.05000
                                                                                         548 42
                      1665.99
                                 2.15421
                                                                   550.33
                                                                             0.05000
                                                                                         546.20
     430
            0.01000
                                            1665.99
                                                       0.02409
                      1755.50
1717.41
                                 2.24113
2.37755
                                            1755.50
1717.41
                                                       0.02301
0.00636
                                                                   550.33
     438
            0.01000
                                                                             0.05000
                                                                                         549.09
            0.01000
                                                                             0.05000
     439
                                                                   550.33
                                                                                         549.97
            0.01000
                       1686.20
                                 2.40248
                                            1686.20
                                                       0.00103
                                                                             0.05000
                                                                                         549.97
     441
            0.01000
                       1661.82
                                 2.31589
                                            1661.82
                                                       0.00699
                                                                   550.33
                                                                             0.05000
                                                                                         548.41
     442
            0.01000
                       1644.35
                                  2.11795
                                            1644.35
                                                       0.02425
                                                                    550.33
                                                                             0.05000
                      1711.92
1677.10
1647.77
     450
            0.01000
                                  2.16670
                                            1711.92
                                                       0.02354
                                                                   550.33
                                                                             0.05000
                                                                                         548.90
                                            1677.10
                                                       0.00922
                                                                             0.05000
     451
            0.01000
                                  2.28116
                                                                   550.33
                                                                                         549.69
     452
            0.01000
                                  2.30090
                                            1647.77
                                                       0.00451
                                                                   550.33
                                                                             0.05000
                                                                                         549.30
     453
            0.01000
                      1623.95
                                  2.22447
                                            1623.95
                                                       0.00954
                                                                   550.33
                                                                             0.05000
                                                                                         547.73
            0.01000
                      1605.90
                                 2.05344
                                            1605.90
                                                       0.02417
                                                                   550.33
                                                                             0.05000
                     OPTIMIZATION SYSTEM FOR TPSSYM =
 TOTAL NUMBER OF DESIGN VARIABLES =
                                        36
 TOTAL NUMBER OF CONSTRAINS
 TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1650E+04
1.0 B B
                                        В
                                                                                                         В
                                                                                                                    В
                                                                                                                               В
                                        D
                                                   D
                                                             D
                                                                                                                               D
   0.0
  -1.0 +
       .08
                    .18
                                 .28
                                              .38
                                                           .48
                                                                         .58
                                                                                                  .78
                                                                                                                .88
                                                                                                                             .98
                                                                                                                                       1.08
                                                                  TIME ( X 1.401E-44 )
                MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4
Tmax: 2300.33 2300.33 550.33 600.33
Optv:
        1650.15 1650.15 549.88 549.88
                     VALUES OF DESIGN VARIABLES :
       DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000
LAYER
                                                                                     0.01000
       2.05560
                 2.09683
                           2.13030
                                     2.01462
                                              2.06486
                                                        2.14598
                                                                  1.63378
                                                                            1.79870
       0.02436
                 0.02404
                           0.02433
                                     0.02606
                                              0.02433
                                                        0.01920
                                                                  0.03813
                                                                            0.02569
                                                                                      0.02667
    4 0.05000 0.05000 0.05000 0.05000 0.05000
                                                        0.05000
                                                                 0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                           89.0599976
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.6166089
THE TOTAL OPTIMAL WEIGHT = 5 35626799E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    Х
        0.1054E+01
                                                Α
   0.0
  -1.0 +
```

```
.48 .58 .68
TIME ( X 1.401E-44 )
            .18
      . 08
                            . 28
                                    .38
                                                                                . 68
                                                                                           . 78
                                                                                                        . 88
                                                                                                                    . 98
                                                                                                                              1.08
              OPTIMAL STRUCTURES OF TPS FOR PATCH =
                     (WITH AVERAGE THICKNESS)
                                  thin skin
                                                                0.01000 in. 1650.2 F
                                                                ----
                      LI-900 (P)
                                            slab
                                                                1.97600 in. 1650.2 F
 -----
                                                                0.02587 in. 549.9 F
                      RTV-560
                                          thin skin
 -----
                                                                0.05000 in. 549.9 F
                      17 LB SIP .16 IN
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                               LAYER02
    371
          0.01000
                    1538.22
                              1.94562
                                         1538.22
                                                   0.02362
                                                              550.33
                                                                       0.05000
                                                                                   549 83
                                         1517.72
1499.26
     372
          0.01000
                    1517.72
1499.26
                              1.92325
                                                   0.02352
                                                              550.33
                                                                       0.05000
                                                                                  549.82
     373
          0.01000
                               1.88427
                                                   0.02529
                                                              550.33
                                                                       0.05000
                                                                                   549.70
                     1482.79
                              1.82889
1.75847
                                                              550.33
                                                                       0.05000
     374
          0.01000
                                         1482.79
                                                   0.02890
                                                                                   549.48
                     1468.52
                                         1468.52
                                                   0.03423
                                                               550.33
                    1497.87
1474.28
                              1.84334
1.83607
     383
          0.01000
                                         1497.87
                                                   0.02667
                                                              550.33
                                                                       0.05000
                                                                                   549.82
     384
          0.01000
                                         1474.28
                                                   0.02450
                                                              550.33
                                                                       0.05000
                                                                                   549.88
                    1453.74
1436.25
                              1.79870
     385
          0.01000
                                         1453.74
                                                   0.02569
                                                              550.33
                                                                       0.05000
                                                                                   549.79
                                                   0.03023
                                                                       0.05000
          0.01000
                                         1436.25
                                                              550.33
                                                                                   549.44
     386
     387
           0.01000
                     1421.80
                               1.63378
                                         1421.80
                                                   0.03813
                                                               550.33
                                                                       0.05000
     419
          0.01000
                     1650.15
                              2.13030
                                         1650.15
                                                   0.02433
                                                              550.33
                                                                       0.05000
                                                                                   549.74
          0.01000
                     1631.46
                    1613.35
1595.86
     421
          0.01000
                              2.09683
                                         1613.35
                                                   0.02404
                                                              550.33
                                                                       0.05000
                                                                                   549 88
     422
                               2.07721
                                         1595.86
                                                   0.02413
                                                              550.33
                                                                       0.05000
                                                                                   549.82
          0.01000
     423
          0.01000
                     1578.94
                              2.05560
                                         1578.94
                                                   0.02436
                                                              550.33
                                                                       0.05000
                                                                                   549.67
                              2.17142
                                                                                   549.80
     431
          0.01000
                     1648.82
                                         1648.82
                                                   0.02029
                                                              550.33
                                                                       0.05000
     432
          0.01000
                     1632.58
                               2.13349
                                         1632.58
                                                   0.02265
                                                              550.33
                                                                       0.05000
                                                                                   549.72
     433
          0.01000
                    1616.40
1600.22
                               2.10371
                                         1616.40
                                                   0.02409
                                                              550.33
                                                                       0.05000
                                                                                   549.70
                                                   0.02460
                                                               550.33
     434
          0.01000
                               2.08202
                                         1600.22
                                                                       0.05000
                                                                                   549.73
     435
          0.01000
                    1584.13
1627.25
                              2.06840
2.14598
                                         1584.13
                                                   0.02421
                                                              550.33
550.33
                                                                       0.05000
                                                                                   549.80
     443
          0.01000
                                         1627.25
                                                   0.01920
                                                                       0.05000
                                                                                   549.83
     444
          0.01000
                     1611.21
                               2.10159
2.06486
                                         1611.21
                                                   0.02219
                                                              550.33
                                                                       0.05000
                                                                                   549.69
     445
          0.01000
                     1595.39
1579.71
                                         1595.39
                                                   0.02433
                                                              550.33
                                                                       0.05000
                                                                                   549.62
     446
          0.01000
                               2.03579
                                         1579.71
                                                   0.02563
                                                              550.33
                                                                       0.05000
                                                                                   549.64
     447
          0.01000
                     1564 26
                               2 01462
                                         1564 26
                                                   0.02606
                                                              550 33
                                                                       0.05000
                                                                                   549 74
           0.01000
                     1586.59
                               2.06106
                                         1586.59
                                                   0.02062
                                                               550.33
                                                                       0.05000
                                                                                   549.84
                               2.02332
1.98362
                                                   0.02259
0.02479
     456
          0.01000
                     1568.89
                                         1568.89
                                                              550.33
                                                                       0.05000
                                                                                   549 73
                     1552.07
                                         1552.07
                                                              550.33
     457
          0.01000
                                                                       0.05000
                                                                                   549.63
     458
          0.01000
                     1536.09
                               1 94200
                                         1536 09
                                                   0 02720
                                                              550.33
                                                                       0.05000
                                                                                   549 56
                                                   0.02978
          0.01000
                     1521.21
                               1.89928
                                         1521.21
                                                              550.33
                                                                      0.05000
                                                                                  549.50
     459
                    OPTIMIZATION SYSTEM FOR TPSSYM = 6
 TOTAL NUMBER OF DESIGN VARIABLES =
 TOTAL NUMBER OF CONSTRAINS = 636
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.1556E+04
1.0 B B
                          В
                                               R
                                                         В
                D
                          D
                                                                                                                      Α
                                                                   D
                                                                              D
                                                                                       D
                                                                                                  D
                                                                                                            D
                                                                                                                      D
  -1.0
                                                                                                       .88
      . 08
                  .18
                                    .38
                                                                                         .78
                                                                                                                    .98
                        .28
                                                       .48
                                                                    . 58
                                                                                                                              1.08
                                                             TIME ( X 1.401E-44 )
               MAXIMUM TEMPERATURE OF EVERY LAYER
       1 2 3 4
2300.33 2300.33 550.33 600.33
1556.36 1556.36 547.20 547.20
LAYER:
Optv:
```

```
VALUES OF DESIGN VARIABLES :
LAYER
       DEV01
               DEV02 DEV03 DEV04 DEV05
                                                DEV/06
                                                         DEV07
                                                                  DEV08
                                                                          DEV09
                      0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000
   1 0.01000
              0.01000
             1.81220
0.03389
                               1.92879 1.81392 1.99431
0.01594 0.03543 0.02550
                                                        1.52682 1.66251
   2 1.82148
                      1.99811 1.92879
                                                                         1.65857
                       0.02671
   3 0.02778
                                                        0.03120
                                                                0.02485
                                                                         0.03280
              0.05000 0.05000 0.07482 0.08000 0.06504 0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                  89.0600052
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5853232
THE TOTAL OPTIMAL WEIGHT = 5.74007395E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   Х
      0.1274E+02
  -1.0 +
              .13 .23 .33 .43 .53 .63 TIME ( X 4.204E-44 )
                                                                                    .73 .83
                                                                                                        .93
                                                                                                                   1.03
            OPTIMAL STRUCTURES OF TPS FOR PATCH =
                   (WITH AVERAGE THICKNESS)
_____
                                                           0.01000 in. 1556.4 F
                    HRSI COAT
                                       thin skin
                    LI-900 (P)
                                        slab
                                                           1.80186 in. 1556.4 F
                    RTV-560
                                       thin skin
                                                           0.02823 in. 547.2 F
 ----
                                                           0.05776 in. 547.2 F
                    17 LB SIP .16 IN
                                       slab
_____
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
         TAYER01
                            LAYER02
                                               LAYER03
                                                                 LAYER04
    376
          0.01000
                   1446.89
                          1.77201
                                     1446.89
                                               0.03018
                  1399.64 1.65857
1556.36 1.99811
                                     1399.64 0.03280
1556.36 0.02671
                                                         550.33
550.33
                                                                            544.90
547.20
    388
          0.01000
                                                                 0.05000
          0.01000
    424
                                                                 0.05000
          0.01000
                   1556.36
                           2.02891
                                      1556.36
                                               0.02526
                                                                  0.06083
                                                                            538.29
    448
          0.01000
                   1543.75
                           1.99431
                                     1543.75
                                               0.02550
                                                         550.33
                                                                 0.06504
                                                                            534.50
          0.01000
                   1499.97
                                      1499.97
                                               0.02751
                                                         550.33
    511
          0.01000
                   1372 95
                           1.67818
                                     1372 95
                                               0.02707
                                                         550 33
                                                                 0.05005
                                                                            544 15
                   1419.21
                           1.74101
    512
          0.01000
                                     1419.21
                                               0.02972
                                                         550.33
                                                                 0.06152
                                                                            536.57
    515
516
         0.01000
0.01000
                   1348.55
1394.85
                           1.66251
1.71424
                                     1348.55
1394.85
                                               0.02485
0.02864
                                                         550.33
550.33
                                                                 0.05000
0.06379
                                                                            543.85
                                                                            536.42
    519
          0.01000
                   1327.20
                           1.61217
                                      1327.20
                                               0.02623
                                                         550.33
                                                                 0.05000
                                                                            543.90
                           1.69260
1.52682
    520
          0.01000
                   1374.17
                                     1374.17
                                               0.02691
                                                         550.33
                                                                 0.06368
                                                                            539.42
          0.01000
                   1308.69
                                      1308.69
                                               0.03120
                                                          550.33
                                                                  0.05000
    523
                   1357.80
1411.19
                                     1357.80
1411.19
    524
          0.01000
                            1.67669
                                               0.02461
                                                         550.33
                                                                 0.06135
                                                                            545.38
   1937
          0.01000
                            1.83195
                                               0.01843
                                                          550.33
                                                                  0.07161
                                                                            546.39
                           1.77882
   1938
          0.01000
                   1425.76
                                      1425.76
                                               0.02792
                                                         550.33
                                                                 0.07608
                                                                            535.40
   1939
          0.01000
                   1445.57
                                      1445.57
                                               0.03267
                                                         550.33
                                                                 0.07619
                                                                            529.83
   1940
          0.01000
                   1470.30
                            1.81091
                                      1470.30
                                               0.03247
                                                         550.33
                                                                  0.07182
   1941
          0.01000
                   1449.78
                           1.92879
                                     1449.78
                                               0.01594
                                                         550.33
                                                                 0.07482
                                                                            546.89
   1942
                   1462.58
                            1.83428
                                      1462.58
                                               0.02937
                                                         550.33
   1943
          0.01000
                   1482.60
                            1.81392
                                     1482.60
                                               0.03543
                                                         550.33
                                                                 0.08000
                                                                            527 97
                   1509.72
   1944
                                      1509.72
                                               0.03411
                                                         550.33
                                                                 0.07502
                                                                            528.07
          0.01000
                            1.86758
                            1.92752
1.84031
   1945
          0.01000
                   1460.90
                                      1460.90
                                               0.01896
                                                         550.33
                                                                 0.06778
                                                                            546.58
                   1472.61
          0.01000
                                      1472.61
                                               0.03086
                                                         550.33
                                                                 0.07154
   1946
                                                                            537.37
   1947
          0.01000
                   1493.53
                            1.82812
                                      1493.53
                                               0.03588
                                                         550.33
                                                                  0.07157
                                                                            532.94
   1948
          0.01000
                   1523.66
                            1.89128
                                      1523.66
                                               0.03399
                                                         550.33
                                                                 0.06791
                                                                            533.31
                   1442.36
   1949
          0.01000
                            1.82148
                                      1442.36
                                               0.02778
                                                         550.33
                                                                  0.05000
                                                                            545.42
   1950
         0.01000
                   1453.89
1476.73
                            1.79243
1.81220
                                      1453.89
                                               0.03250
                                                         550.33
                                                                 0.05003
                                                                            545.01
          0.01000
                                      1476.73
                                                         550.33
                                                                 0.05000
   1951
                                               0.03389
                                                                            545.19
   1952
         0.01000
                   1510.97
                            1.88101
                                     1510.97
                                               0.03194
                                                         550.33
                                                                 0.05000
                                                                           545.91
```

```
TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 596
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.1440E+04
1.0 B B
                                                                                                     В
                       D
  0.0 -----
 -1.0 +
                                                    .58 .68
TIME ( X 1.401E-44 )
            MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4
Tmax: 2300.33 2300.33 550.33 600.33
Optv: 1439.59 1439.59 550.16 550.16
                VALUES OF DESIGN VARIABLES :
LAYER
   ER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06
1 0.01000 0.01094 0.01000 0.01000 0.01098 0.01000
                                                      DEV07
                                                              DEV08
                                                    0.01000
                                                            0.01015
                                                                    0.01000
     1.82137
     1.82137 1.74461 1.80796 1.70278 1.74113 0.02748 0.03172 0.02662 0.03306 0.03180
                                            1.83854
                                                    1.34930
                                                            1.48626
                                                    0.03731
                                                            0.02676
                                                                    0.02167
   4 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5455250
THE TOTAL OPTIMAL WEIGHT = 4.69528964E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.5483E+00
  1.0 A
  0 0 ------
 -1.0 +
                                                   .56 .66
TIME ( X 2.803E-44 )
              .16
                       .26 .36
                                                                            .76 .86 .96
                                                                                                          1.06
            OPTIMAL STRUCTURES OF TPS FOR PATCH =
                  (WITH AVERAGE THICKNESS)
                   HRSI COAT
                                                       0.01023 in. 1439.6 F
                                     thin skin
                                                       1.67384 in. 1439.6 F
                   LI-900 (P)
                                     slab
 -----
                   RTV-560
                                     thin skin
                                                       0.02892 in. 550.2 F
 ______
                                                       ----
                                                       0.05000 in. 550.2 F
                   17 LB SIP .16 IN
                                   slab
```

THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = PANEL LAYER01 LAYER02 LAYER03 LAYER04 1271.30 1271.30 550.33 549.17 617 0.01000 1.42681 0.03676 0.05000 0.01000 1279.49 1279.49 0.03662 550.33 549.25 613 0.01000 1233.56 1.34930 1233.56 0.03731 550.33 0.05000 548.79 0.01014 1246.31 1.41236 1246.31 0.03196 550.33 0.05000 549.83 614 615 0.01015 1260.71 1.48626 1260.71 0.02676 550.33 0.05000 550.05 616 0.01000 1277.05 1.57262 1277.05 0.02167 550.33 0.05000 549.38 0.01024 1282.83 1.45804 0.03498 1305.33 1328.69 619 0.01044 1.54010 1305.33 0.02979 550.33 0.05000 549.92 1.65245 1328.69 0.02278 550.33 620 0.01006 621 0.01000 1332.97 1.55730 1332.97 0.03547 550.33 0.05000 549.73 1.57841 1347.46 0.03517 550.33 0.05000 622 0.01050 1347.46 549.71 623 0.01080 1370.11 1.64345 1370.11 0.03154 550.33 0.05000 549.74 624 0.01009 1391.04 1.75595 1391.04 0.02354 550.33 0.05000 549.98 1396.57 1.70278 626 0.01098 1411.18 1.69603 1411.18 0.03491 550.33 0.05000 549.64 627 0.01098 1425.22 1.74114 1425.22 0.03180 550.33 0.05000 628 0.01000 1439.59 1.83854 1439.59 0.02386 550.33 0.05000 550 16 0.01000 1425.43 1.78420 1425.43 0.03044 550.33 0.05000 550.09 629 630 0.01104 1432.43 1.74418 1432.43 0.03413 550.33 0.05000 549.63 1.76823 631 0.01106 1439.59 1439.59 0.03233 550.33 0.05000 549.60 1.85383 1439.59 0.01000 0.02512 633 0.01000 1429.21 1.82137 1429.21 0.02748 550.33 0.05000 549.69 1.74892 634 0.01094 1424.26 1424.26 0.03199 550.33 0.05000 549.66 635 0.01094 1427.13 1.74461 1427.13 0.03172 550.33 0.05000 549.65 0.01000 1438.18 1.80796 0.02662 0.05000 636 1438.18 550.33 549.63 OPTIMIZATION SYSTEM FOR TPSSYM = TOTAL NUMBER OF DESIGN VARIABLES = 36 TOTAL NUMBER OF CONSTRAINS = 620 TOTAL NUMBER OF TEMP. CONSTRAINS = 468 TOTAL NUMBER OF TEMP. PRINTOUTS = MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES 0.1427E+04 1 0 B В В R В В В В Α D Α D D D D D D D D 0.0 .58 .68 TIME (X 1.401E-44) 0.8 .18 2.8 3.8 68 78 8.8 9.8 1 08 MAXIMUM TEMPERATURE OF EVERY LAYER 3 550.33 LAYER: 2300.33 2300.33 Tmax: Optv: 1426.84 1426.84 550.28 550.28 VALUES OF DESIGN VARIABLES : LAYER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 1.60326 1.82617 2.09737 1.68987 1.65716 2.02694 1.58430 1.60155 1.61659 0.02214 0.00131 0.02693 0.03667 0.02465 0.02926 0.03257 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 THE ORIGINAL OBJECTIVE FUNCTION = 83.1222305 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5645866 THE TOTAL OPTIMAL WEIGHT = 3.75268118E+04 MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.1274E+02 1.0 +

```
-1.0 +
      .01
               .11
                         .21 .31
                                                     .51 .61
TIME ( X 1.682E-43 )
                                                                                .71
                                                                                           .81
                                                                                                      .91
            OPTIMAL STRUCTURES OF TPS FOR PATCH =
                   (WITH AVERAGE THICKNESS)
0.01000 in. 1426.8 F
                   HRST COAT
                                     thin skin
-----
                   LI-900 (P)
                                                        1.74480 in. 1426.8 F
-----
                   RTV-560
                                                         0.02705 in. 550.3 F
 ______
                                                        ----
                   17 LB SIP .16 IN
                                      slah
                                                         0.05000 in. 550.3 F
 _____
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
         LAYER01
                           LAYER02
                                             LAYER03
                                                               LAYER04
   1174
                  1303.29
                                    1303.29
                                                       550.33
                                                               0.05000
                                                                        544.41
         0.01000
                           1.58430
                                             0.02926
   1175
         0.01000
                  1307.44
1313.98
                          1.59027
                                    1307.44
1313.98
                                             0.03002
                                                       550.33
                                                               0.05000
                                                                        540.46
537.23
                           1.59602
                                                       550.33
                                                               0.05000
   1176
         0.01000
                                             0.03113
   1177
         0.01000
                  1322.80
                           1.60155
                                    1322.80
                                             0.03257
                                                       550.33
                                                               0.05000
   1178
         0.01000
                  1334 64
                           1.60805
                                    1334 64
                                             0 03441
                                                       550 33
                                                               0.05000
                                                                         532 76
                  1348.51
   1179
         0.01000
                           1.61463
                                    1348.51
                                             0.03650
                                                       550.33
                                                               0.05000
                                                                         531.52
                          1.61659
1.68987
                                                       550.33
550.33
   1180
         0.01000
                  1364.41
                                    1364.41
                                             0.03900
                                                               0.05000
                                                                         532.40
                  1346.97
   1181
         0.01000
                                    1346.97
                                             0.02693
                                                               0.05000
                                                                         543.14
   1182
         0.01000
                  1352.14
                           1.63803
                                    1352.14
                                             0 03231
                                                       550.32
                                                               0.05000
                                                                         546.83
         0.01000
                  1358.27
                           1.62571
                                    1358.27
                                             0.03564
                                                       550.32
                                                               0.05000
                                                                         542.48
   1183
   1184
         0.01000
                  1365.25
                           1.65713
                                    1365.25
                                             0.03666
                                                       550.32
                                                               0.05000
                                                                         529.26
   1185
         0.01000
                  1372.88
                           1.73520
                                    1372.88
                                             0.03517
                                                       550.32
                                                               0.05000
                                                                        506.62
   1186
         0.01000
                  1380.98
1389.27
                           1.86024
                                    1380.98
                                             0.03109
                                                       550.32
                                                               0.05000
                                                                         474.57
   1187
         0.01000
                           2.02694
                                    1389.27
                                             0.02465
                                                       550.33
                                                               0.05000
                                                                         434 19
                  1349.99
                                    1349.99
                                             0.02772
                                                       550.33
                                                               0.05000
   1188
         0.01000
                           1.68960
                                                                         541.60
   1189
         0.01000
                  1362.97
                           1.66398
                                    1362.97
                                             0.03201
                                                       550.32
                                                               0.05000
                           1.67809
1.73630
                                                               0.05000
   1190
         0.01000
                  1374.83
                                    1374.83
                                             0.03373
                                                       550.32
                                                                         540.55
   1191
         0.01000
                  1385.73
                                    1385.73
                                             0.03257
                                                       550.32
                                                               0.05000
   1192
         0.01000
                  1395.39
1403.85
                           1.83853
                                    1395.39
                                             0.02853
                                                       550.32
                                                               0.05000
                                                                         509.64
                           1.98605
                                             0.02146
                                                       550.32
   1193
         0.01000
                                    1403.85
                                                               0.05000
                                                                         482.82
                                                       550.33
550.33
   1194
         0.01000
                  1410.91
                           2.17534
                                    1410.91
                                             0.01153
                                                               0.05000
                                                                         449.16
         0.01000
                           1.60326
   1195
                  1319.55
                                    1319.55
                                                               0.05000
                                             0.03095
                                                                         540.03
   1196
         0.01000
                  1345.04
                           1.67202
                                    1345.04
                                             0.02938
                                                       550.33
                                                               0.05000
   1197
         0.01000
                  1367.22
                           1.74534
                                    1367.22
                                             0.02653
                                                       550.33
                                                               0.05000
                                                                         533.43
   1198
         0.01000
                  1386.46
                                    1386.46
                                             0.02214
                                                               0.05000
   1199
         0.01000
                  1402 96
                           1 91071
                                    1402 96
                                             0.01671
                                                       550 33
                                                               0.05000
                                                                         536 16
                           2.00240
                                             0.00973
   1200
         0.01000
                  1416.35
                                    1416.35
                                                       550.33
                                                               0.05000
   1201
         0.01000
                  1426.84
                           2.09737
                                    1426.84
                                             0.00131
                                                       550.33
                                                               0.05000
                                                                        550.28
                 OPTIMIZATION SYSTEM FOR TPSSYM =
TOTAL NUMBER OF DESIGN VARIABLES =
                                 36
 TOTAL NUMBER OF CONSTRAINS
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1337E+04
  1.0 B
                                В
                                                                            В
                                                                                               В
                                                                                                        В
                       D
                                D
                                                  D
                                                           D
```

```
D
                                                                           D
                                                                                             D
                                                                                                       D
 -1.0
                                     .38
                                                .48
                                                     .58 .68
TIME ( X 1.401E-44 )
                                                                                .78
     .08
                .18
                          .28
                                                                       .68
                                                                                           .88
                                                                                                      .98
                                                                                                               1.08
             MAXIMUM TEMPERATURE OF EVERY LAYER
                       3 550.33 600.33 550.27 550.27
LAYER:
      2300.33 2300.33
Optv:
      1337.01 1337.01 550.27
                 VALUES OF DESIGN VARIABLES :
               DEV02
                     DEV03 DEV04
                                      DEV05
   1 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000
                     1.56943 1.51552 1.57372
   2 1.36658
              1.39460
                                              1.94763
                                                      1.37531
                                                              1.52683
                                                                      1.56559
      0.03455
              0.03886
                      0.02933
                              0.02812
                                      0.03084
                                              0.00108
                                                      0.03779
                                                              0.02881
   4 0.05000 0.05000 0.05000 0.05000 0.05000
                                              0.05000
                                                     0.05000
                                                              0.05000
                                                                      0.05000
                                   94.9787903
THE ORIGINAL OBJECTIVE FUNCTION =
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5139174
THE TOTAL OPTIMAL WEIGHT = 2.79286842E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.1274E+02
1.0 +
                                                                Α
                                                                                Α
                                                                                       А
                                                                                              Α
                                                                                                      Α
                                                                                                              Α
 -1.0 +
                                                .43 .53 ...
TIME ( X 4.204E-44 )
               .13
                                                                                .73
      .03
                         .23
                                  .33
                                                                                           .83
                                                                                                    .93
                                                                                                               1.03
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                  (WITH AVERAGE THICKNESS)
                   HRSI COAT
                                   thin skin
                                                         0.01000 in. 1337.0 F
 ______
                    T.T-900 (P)
                                                         1 53714 in 1337 0 F
                                      slah
                   RTV-560
                                                         0.02887 in. 550.3 F
                                      thin skin
_____
                                                         0.05000 in. 550.3 F
                   17 LB SIP .16 IN
_____
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
                           LAYER02
   1886
         0.01000
                  1230.64
                           1.37531
                                    1230.64
                                             0.03779
                                                       550.33
                                                               0.05000
                                                                         543 61
   1887
         0.01000
                  1242.36
                                    1242.36
                                             0.03413
                                                       550.33
                                                               0.05000
                                                                         542.41
                  1252.52
1261.69
                           1.46872
1.50131
                                             0.03156
0.02982
                                                       550.33
550.33
                                                               0.05000
   1888
         0.01000
                                    1252.52
                                                                         541.54
         0.01000
                                    1261.69
                                                                         540.91
   1889
   1890
         0.01000
                  1270.11
                           1.52683
                                    1270.11
                                             0.02881
                                                       550.33
                                                               0.05000
                                                                         540.50
                  1277.96
1285.98
                           1.54593
1.55959
                                    1277.96
1285.98
                                                       550.33
550.33
   1891
         0.01000
                                             0.02849
                                                               0.05000
                                                                         540.50
         0.01000
                                             0.02894
                                                               0.05000
   1892
                                                                         540.50
   1893
         0.01000
                  1294.30
1264.59
                           1.56559
                                    1294.30
                                             0.03050
                                                       550.33
                                                               0.05000
                                                                         540.58
                                                               0.05000
         0.01000
                           1.51552
                                    1264.59
                                             0.02812
                                                       550.33
   1894
                                                                         545.40
   1895
         0.01000
                  1273.77
                           1.49282
                                    1273.77
                                             0.03289
                                                       550.14
                                                               0.04998
                                                                         542.23
                                    1282.15
                                                       550.04
         0.00999
                  1282.15
                           1.50027
                                             0.03427
                                                               0.04997
                                                                         540.71
   1896
                          1.57276
         0.00999
   1898
                  1298.44
                                    1298.44
                                             0.03081
                                                       549.97
                                                               0.04997
                                                                         540.58
```

```
1899
           0.00999
                      1307.40
                                1.63838
                                           1307.40
                                                      0.02618
                                                                  550.01
                                                                           0.04997
                                                                                       541.76
    1900
           0.01000
                      1319.78
                                 1.75236
                                           1319.78
                                                      0.01732
                                                                  550.10
                                                                            0.04998
                                                                                        544.51
    1901
           0.01000
                      1337 01
                                 1 94763
                                           1337.01
                                                      0.00108
                                                                  550 33
                                                                            0.05000
                                                                                        550 09
                                                                                        547.58
    1902
           0.01000
                      1259.03
                                 1.51203
                                            1259.03
                                                      0.02713
                                                                  550.33
                                                                            0.05000
    1903
           0.01000
                      1265.71
                                 1.46663
                                           1265.71
                                                      0.03409
                                                                  550.14
                                                                            0.04998
                                                                                        544.16
           0.00999
                      1272.85
                                 1.46067
                                            1272.85
                                                      0.03678
                                                                  550.04
                                                                            0.04997
                                                                                        542.47
    1904
    1905
            0.00999
                      1280.39
                                 1.48006
                                            1280.39
                                                      0.03675
                                                                   549.99
                                                                            0.04997
                                                                                        541.88
    1906
           0.00999
                      1288.67
                                 1.52037
                                            1288.67
                                                      0.03458
                                                                  549.98
                                                                            0.04997
                                                                                        542.10
    1907
            0.00999
                      1299.03
                                 1.58930
                                            1299.03
                                                      0.02979
                                                                            0.04997
                                                                                        543.23
    1908
           0.01000
                      1313.99
                                 1.71312
                                            1313.99
                                                      0.02014
                                                                  550.11
                                                                            0.04998
                                                                                        546.01
                                 1.91598
                                                      0.00325
    1909
           0.01000
                      1334.88
                                            1334.88
                                                                   550.33
                                                                            0.05000
                                                                                        550.27
    1910
            0.01000
                      1213.62
                                 1.36658
                                            1213.62
                                                      0.03455
                                                                   550.33
                                                                            0.05000
                                                                                        550.27
    1911
           0.01000
                      1219.63
                                 1.35434
                                           1219.63
                                                      0.03744
                                                                  550.33
                                                                            0.05000
                                                                                        548.11
    1912
            0.01000
                      1227.09
                                            1227.09
                                                      0.03895
    1913
           0.01000
                      1236.18
                                 1.36967
                                            1236.18
                                                      0.03940
                                                                  550.33
                                                                            0.05000
                                                                                        545.58
    1914
                      1246.99
                                 1.39460
                                                      0.03886
            0.01000
                                            1246.99
                                                                   550.33
                                                                            0.05000
    1915
           0.01000
                      1260.50
                                 1.43402
                                           1260.50
                                                      0.03718
                                                                  550.33
                                                                           0.05000
                                                                                        544.80
                      1277.44
                                            1277.44
                                                      0.03406
                                                                            0.05000
    1916
           0.01000
                                 1.49160
                                                                  550.33
                                                                                        545.14
    1917
           0.01000
                      1298.18
                                 1.56943
                                           1298.18
                                                      0.02933
                                                                            0.05000
                     OPTIMIZATION SYSTEM FOR TPSSYM = 10
 TOTAL NUMBER OF DESIGN VARIABLES =
                                        80
 TOTAL NUMBER OF CONSTRAINS = 1640
TOTAL NUMBER OF TEMP. CONSTRAINS = 1040
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X 0.1719E+04
   1.0 B
                             В
                                       В
                  C
                             C
                                                  В
                                       C
                                                                                                                  В
                             Ε
                                       Е
                                                  Ε
   0.0
  -1.0
       .08
                    .18
                                 .28
                                              .38
                                                          .48
                                                                .58 .68
TIME ( X 1.401E-44 )
                                                                                                 .78
                                                                                                              . 88
                                                                                                                           .98
                                                                                                                                     1.08
               MAXIMUM TEMPERATURE OF EVERY LAYER
        1 2 3
2800.33 2900.33 2700.33
                                      4
550.33
                                                600.33
Tmax:
        1718.85 1718.85 956.42
                                      514.00
Optv:
                    VALUES OF DESIGN VARIABLES :
LAYER
         DEV01
                   DEV02
                            DEV03
                                     DEV04
                                                DEV05
                                                         DEV06
                                                                   DEV07
                                                                             DEV08
                                                                                      DEV09
                                                                                                DEV10
                                                                                                          DEV11
                                                                                                                   DEV12
                                                                                                                             DEV13
DEV14
         DEV15
                  DEV16
       0.01000 0.01000
                         0.01000 \quad 0.01000 \quad 0.01000 \quad 0.01000 \quad 0.01000 \quad 0.01000 \quad 0.01000 \quad 0.01000 \quad 0.01000 \quad 0.01000 \quad 0.01000
0.01000 0.01000 0.01000
    2 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000
0.01000 0.01000 0.01000
3 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000 1.00000
1.00000 1.00000 1.00000 4 0.00100 0.00100 0.00100 0.00100 0.00100 0.00100 0.00100 0.00100 0.00100 0.00100 0.00100
0.00100 0.00100 0.00100
5 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
THE ORIGINAL OBJECTIVE FUNCTION = 1619.0898438
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.1098324
 THE TOTAL OPTIMAL WEIGHT = 1.39254345E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
       0.1949E+00
   1.0 +
```

```
0 0
 -1.0 +
      .09
                                                             .59 .69
TIME ( X 1.401E-44 )
                                                                                             .79
                                                                                                         .89
                                                                                                                      .99
                                          .39
                                                                                                                                1.09
             OPTIMAL STRUCTURES OF TPS FOR PATCH = 10
(WITH AVERAGE THICKNESS)

ACC((N) thin skin
                                                                 0.01000 in. 1718.8 F
       0.03000 in. ZIRCONIUM
                                           radiation gap 0.01000 in. 1718.8 F
      0.03000 in. ZIRCONIUM
_____
                     LI-2200 (N) slab
                                                                 0.99999 in. 956.4 F
                                                                 i
                                                                 0.00100 in. 514.0 F
RTV-560 thin skin
                      17 LB SIP .16 IN
                                                                 0.05000 in. 514.0 F
______
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                              LAYER02
                                                                                             LAYER05
 PANEL
          LAYER01
                                                   LAYER03
                                                                        LAYER04
          0.01000
                    1319.63
                              0.01000
                                         1319.63
                                                   1.00000
                                                             1125.61
                                                                        0.00100
                                                                                   550.05
                                                                                            0.05000
                                                                                                        494.62
          0.01000
                    1318.48
                            0.01000
                                         1318.48
                                                              1124.35
                                                                        0.00100
                                                                                   550.03
    662
                                                                                                        493.59
          0.01001
                    1334.59
                              0.01001
                                         1334.59
                                                   1.00090
                                                              1136.47
                                                                        0.00100
                                                                                    550.33
                                                                                             0.05005
                                                                                                        500.65
    663
                    1307.50
1297.79
                                         1307.50
1297.79
    664
          0 00999
                              0 00999
                                                   0 99948
                                                              1112 43
                                                                        0 00100
                                                                                    545 31
                                                                                             0 04997
                                                                                                        483 13
    665
          0.01000
                              0.01000
                                                   1.00000
                                                              1102.02
                                                                        0.00100
                                                                                    549.90
                                                                                             0.05000
                                                                                                        475.22
                    1296.39
1306.97
                              0.01000
0.01001
                                         1296.39
1306.97
    666
          0.01000
                                                   1.00000
                                                              1100.52
                                                                        0.00100
                                                                                    549.90
                                                                                             0.05000
                                                                                                        473 99
          0.01001
                                                   1.00057
                                                              1108.81
                                                                        0.00100
                                                                                   550.33
                                                                                             0.05003
                                                                                                        479.00
    667
    668
          0.01000
                    1301.86
                              0.01000
                                         1301.86
                                                   1.00002
                                                              1102.65
                                                                        0.00100
                                                                                    546.53
                                                                                             0.05000
                                                                                                        473 47
                    1269.32
                                                   1.00000
                                                              1071.67
                                                                                    549.90
                                                                                             0.05000
    669
          0.01000
                              0.01000
                                         1269.32
                                                                        0.00100
                                                                                                        450.14
    670
          0.01000
                    1267.88
                              0.01000
                                         1267.88
                                                   1.00000
                                                              1070.14
                                                                        0.00100
                                                                                    549.90
                                                                                             0.05000
                                                                                                        448.87
    671
          0.01001
                    1283.06
                              0.01001
                                         1283.06
                                                   1.00059
                                                              1082.19
                                                                        0.00100
                                                                                   550.33
                                                                                             0.05003
                                                                                                        455.87
    672
          0.01000
                    1259.51
                              0.01000
                                         1259.51
                                                   0.99983
                                                              1059.34
                                                                        0.00100
                                                                                    540.98
                                                                                             0.04999
                                                                                                         441.27
    673
          0.01000
                    1233.80
                              0.01000
                                         1233 80
                                                   1.00000
                                                              1034 08
                                                                        0 00100
                                                                                    550 03
                                                                                             0.05000
                                                                                                        418 94
                              0.01000
    674
                                                   1.00016
                                                              1037.56
                                                                        0.00100
                                                                                    550.33
                                                                                             0.05001
          0.01000
                    1238.37
                                         1238.37
                                                                                                        420.37
                                                                                    544.61
    675
          0.01000
                    1218.31
                              0.01000
                                         1218.31
                                                   1.00007
                                                              1016.22
                                                                        0.00100
                                                                                             0.05000
                                                                                                         407.29
                    1045.70
1190.83
                                                   0.99975
    676
          0.01000
                              0.01000
                                         1045.70
                                                               860.30
                                                                        0.00100
                                                                                    479.03
                                                                                             0.04999
                                                                                                        321.18
    677
          0.01000
                              0.01000
                                         1190.83
                                                   1.00000
                                                               988.81
                                                                        0.00100
                                                                                    550.33
                                                                                             0.05000
    678
          0.01000
                    1164.41
                              0.01000
                                         1164.41
                                                   1.00000
                                                               962.11
                                                                        0.00100
                                                                                    550.33
                                                                                             0.05000
                                                                                                        364.87
                    1083.32
                                         1083.32
                                                                                             0.05000
          0.01000
                              0.01000
                                                   1.00000
                                                               885.32
                                                                        0.00100
                                                                                    505.23
                                                                                                        323.16
                    996.19
1236.21
                              0.01000
    680
          0.01000
                                          996.19
                                                   1.00000
                                                               802.46
                                                                        0.00100
                                                                                    442.92
                                                                                             0.05000
                                                                                                        277.11
          0.01000
                                         1236.21
                                                                        0.00100
                                                                                    550.33
                                                                                             0.04998
                                                                                                        359.86
   1001
                                                   0.99950
                                                              1008.01
   1002
          0.01000
                    1202.19
                              0.01000
                                         1202.19
                                                   0.99976
                                                               974.02
                                                                        0.00100
                                                                                    547.55
                                                                                             0.04999
                                                                                                         341.41
   1003
          0.01001
                    1033.13
                              0.01001
                                         1033.13
                                                   1.00097
                                                               847.38
                                                                        0.00100
                                                                                   512.03
                                                                                             0.05005
                                                                                                        315.86
          0.01000
                    1512.05
                              0.01000
                                         1512.05
                                                   1.00013
                                                              1159.55
                                                                        0.00100
                                                                                    493.69
                                                                                             0.05001
                                                                                                         365.76
   1004
   1005
          0.01000
                    1218 34
                              0.01000
                                         1218 34
                                                   0 99959
                                                              1005 19
                                                                        0 00100
                                                                                    550 33
                                                                                             0 04998
                                                                                                        373 09
   1006
          0.01000
                    1176.82
                              0.01000
                                         1176.82
                                                   0.99973
                                                               966.86
                                                                        0.00100
                                                                                    549.05
                                                                                             0.04999
                                                                                                         352.62
                              0.01001
0.01000
                                         1056.95
1636.22
                                                   1.00102
1.00013
                                                              875.06
1250.66
                                                                        0.00100
0.00100
                                                                                            0.05005
0.05001
                                                                                                        334.11
   1007
          0.01001
                    1056.95
                                                                                    523.90
                    1636.22
   1008
          0.01000
                                                                                    507.59
                                                                                                        389.93
   1009
          0.01000
                    1218.59
                              0.01000
                                         1218.59
                                                   0.99975
                                                              1016.46
                                                                        0.00100
                                                                                    549.75
                                                                                             0.04999
                                                                                                        393.70
                    1174.58
1092.55
   1010
          0.01000
                              0.01000
                                         1174.58
                                                   0.99977
                                                               977.51
                                                                        0.00100
                                                                                    549.88
                                                                                             0.04999
                                                                                                        372.84
                              0.01001
                                         1092.55
                                                   1.00091
                                                               913.10
                                                                                             0.05005
                                                                                                         359.35
   1011
          0.01001
                                                                                    534.50
   1012
          0.01000
                    1708.79
                              0.01000
                                         1708.79
                                                   1.00009
                                                              1309.26
                                                                        0.00100
                                                                                    522.46
                                                                                             0.05000
                                                                                                        411.59
   1013
          0.01000
                    1231.21
                              0.01000
                                         1231.21
                                                   0.99991
                                                              1036.91
                                                                        0.00100
                                                                                    549.71
                                                                                             0.05000
                                                                                                        418.52
   1014
          0.01000
                    1189.85
                              0.01000
                                         1189.85
                                                   0.99987
                                                              1001.10
                                                                        0.00100
                                                                                    550.25
                                                                                             0.04999
                                                                                                        399.02
   1015
          0.01001
                    1136.61
                              0.01001
                                         1136.61
                                                   1.00068
                                                               957.90
                                                                        0.00100
                                                                                    543.40
                                                                                             0.05003
                                                                                                        388.73
   1016
          0.01000
                    1718.85
                              0.01000
                                         1718.85
                                                   1.00003
                                                              1337.18
                                                                        0.00100
                                                                                    537.09
                                                                                             0.05000
                                                                                                         429.39
   1017
          0.01000
                    1251.07
                              0.01000
                                         1251.07
                                                   1.00000
                                                              1062.08
                                                                        0.00100
                                                                                    550.33
                                                                                            0.05000
                                                                                                        444.49
   1018
                    1217.07
                                         1217.07
                                                   1.00001
                                                              1032.82
                                                                                    550.33
                                                                                             0.05000
   1019
          0.01000
                    1184.73
                              0.01000
                                         1184 73
                                                   1 00037
                                                              1005 23
                                                                        0 00100
                                                                                    550 33
                                                                                             0.05002
                                                                                                        419 29
                    1718.85
                                                   1.00000
                                                              1337.18
                                                                                    550.33
                                                                                             0.05000
   1020
          0.01000
                              0.01000
                                         1718.85
                                                                        0.00100
                                                                                                        441.95
   1021
          0.01000
                    1281.68
                              0.01000
                                         1281.68
                                                   1.00000
                                                              1092.55
                                                                        0.00100
                                                                                    550.33
                                                                                             0.05000
                                                                                                        468.24
          0.01000
                              0.01000
                                                   1.00018
                                                              1067.33
                                                                        0.00100
                                                                                    550.30
                                                                                             0.05001
                                                                                                        457.14
   1022
                    1249.85
                                         1249.85
   1023
          0.01000
                    1228.93
                              0.01000
                                         1228.93
                                                   1.00001
                                                              1048.77
                                                                        0.00100
                                                                                    550.33
                                                                                             0.05000
                                                                                                        448.13
                    1641.12
1307.46
                                         1641.12
1307.46
   1024
          0.01000
                              0.01000
                                                   1.00000
                                                              1295.58
                                                                        0.00100
                                                                                    550.33
                                                                                            0.05000
                                                                                                        447.82
                              0.01000
                                                   1.00000
                                                                                             0.05000
   1025
          0.01000
                                                              1118.00
                                                                        0.00100
                                                                                    550.33
                                                                                                        488.44
   1026
          0.01000
                    1284.29
                              0.01000
                                         1284.29
                                                   1.00034
                                                              1101.00
                                                                        0.00100
                                                                                    550.28
                                                                                             0.05002
                                                                                                        483.22
                              0.01000
                                                   0.99965
                                                                        0.00100
   1027
          0.01000
                    1268.51
                                                              1086.44
                                                                                    550.33
                                                                                             0.04998
                                                                                                        472.36
                                         1268.51
   1028
          0.01000
                    1548.01
                               0.01000
                                         1548.01
                                                   0.99997
                                                              1241.24
                                                                        0.00100
                                                                                    550.33
                                                                                             0.05000
                                                                                                        448.44
          0.01000
                    1326.19
                                         1326.19
                                                   1.00000
                                                                                   550.33
                                                                                            0.05000
   1029
                              0.01000
                                                              1136.13
                                                                        0.00100
                                                                                                        503.05
                                                   1.00049
   1031
          0.00999
                    1298.15
                              0.00999
                                         1298.15
                                                   0.99933
                                                              1113.36
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                                                                                   550.33
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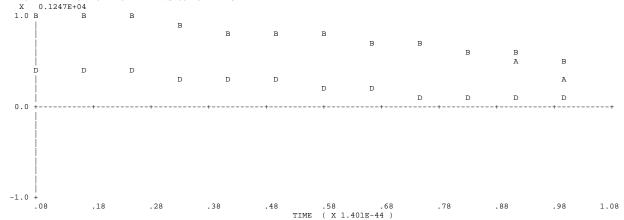
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           0.01000
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                                                                                       550.33
                                                                                                0.05000
                                                                                                            442.34
    1033
           0.01000
                      1335.63
                                0.01000
                                           1335.63
                                                      1.00000
                                                                1144.63
                                                                           0.00100
                                                                                       550.33
                                                                                                0.05000
                                                                                                            510.03
    1034
           0.01001
                      1337.11
                                0.01001
                                           1337.11
                                                      1 00059
                                                                1147 43
                                                                           0 00100
                                                                                       550 33
                                                                                                0.05003
                                                                                                            514 00
    1035
           0.00999
                      1312.22
                                0.00999
                                           1312.22
                                                      0.99907
                                                                1124.44
                                                                           0.00100
                                                                                       550.33
                                                                                                0.04995
                                                                                                            494.35
                      1334.21
                                0.01000
    1036
           0.01000
                                           1334.21
                                                      0.99995
                                                                1101.79
                                                                           0.00100
                                                                                       550.33
                                                                                                0.05000
                                                                                                            428.13
                                                      1.00000
                                                                                                0.05000
           0.01000
                      1333.56
                                0.01000
                                           1333.56
                                                                 1141.20
                                                                           0.00100
                                                                                       550.33
                                                                                                            507.33
    1037
    1038
           0.01001
                      1344.81
                                0.01001
                                           1344.81
                                                      1.00062
                                                                 1150.84
                                                                           0.00100
                                                                                       550.33
                                                                                                0.05003
                                                                                                            514.00
    1039
           0.00999
                      1304.95
                                0.00999
                                           1304.95
                                                      0.99892
                                                                1114.43
                                                                           0.00100
                                                                                       549.81
                                                                                                0.04995
                                                                                                            485.67
    1040
           0.01000
                      1223.40
                                0.01000
                                           1223.40
                                                      1.00000
                                                                 1021.00
                                                                           0.00100
                                                                                                0.05000
                                                                                                            404.76
    1290
           0.01000
                      1088.41
                                0.01000
                                           1088.41
                                                      1.00000
                                                                 900.46
                                                                           0.00100
                                                                                       528.63
                                                                                                0.05000
                                                                                                            344.74
                                                      1.00000
                                                                1129.18
                                                                                                0.05000
    1291
           0.01000
                      1439.45
                                0.01000
                                           1439.45
                                                                           0.00100
                                                                                       550.33
                                                                                                            377.88
    1292
           0.01000
                      1050.82
                                0.01000
                                           1050.82
                                                      1.00000
                                                                 848.58
                                                                           0.00100
                                                                                       481.48
                                                                                                0.05000
                                                                                                            316.62
    1293
           0.01000
                      1042.78
                                0.01000
                                           1042.78
                                                      1.00000
                                                                 841.70
                                                                           0.00100
                                                                                       476.12
                                                                                                0.05000
                                                                                                            311.62
    1294
           0.01000
                      1173.42
                                0.01000
                                                      0.99992
                                                                 958.38
                                                                           0.00100
                                                                                       540.83
                                                                                                0.05000
                                                                                                            350.39
    1295
           0.01000
                      1359.89
                                0.01000
                                           1359.89
                                                      0.99988
                                                                1073.52
                                                                           0.00100
                                                                                       548.01
                                                                                                0.04999
                                                                                                            359.94
    1296
                      1028.23
                                0.01000
                                           1028.23
                                                      1.00034
                                                                 832.90
                                                                                                0.05002
           0.01000
                                                                           0.00100
                                                                                       486.98
                                                                                                            308.85
    1297
           0.01000
                      1188.35
                                0.01000
                                           1188.35
                                                      1.00000
                                                                 938.07
                                                                           0.00100
                                                                                       478.39
                                                                                                0.05000
                                                                                                            325.34
    1298
           0.01000
                                                      0.99975
                                                                 991.87
                                                                           0.00100
                                                                                       548.04
                                                                                                0.04999
                      1221.64
                                0.01000
                                           1221.64
                                                                                                            353.32
    1299
           0.01000
                      1296.76
                                0.01000
                                           1296.76
                                                      0.99982
                                                                1031.01
                                                                           0.00100
                                                                                       547.09
                                                                                                0.04999
                                                                                                            348.24
    1300
           0.01001
                      1024.96
                                0.01001
                                           1024.96
                                                      1.00061
                                                                 832.38
                                                                           0.00100
                                                                                       494.79
                                                                                                0.05003
                                                                                                            307.00
    1301
           0.01000
                      1316.99
                                0.01000
                                                      1.00000
                                                                 1024.26
                                                                           0.00100
                                                                                       481.80
                                                                                                0.05000
                                                                                                            338.93
    1302
           0.01000
                      1246.97
                                0.01000
                                           1246.97
                                                      0.99958
                                                                1010.58
                                                                           0.00100
                                                                                       550.33
                                                                                                0.04998
                                                                                                            355.69
    1303
           0.01000
                      1246.59
                                0.01000
                                           1246.59
                                                      0.99979
                                                                 998.83
                                                                           0.00100
                                                                                       546.64
                                                                                                0.04999
                                                                                                            341.73
    1304
           0.01001
                      1026 16
                                0.01001
                                           1026 16
                                                      1 00079
                                                                 836 30
                                                                           0.00100
                                                                                       502 45
                                                                                                0.05004
                                                                                                            308 56
    1305
           0.01000
                     1395.98
                                0.01000
                                           1395.98
                                                      1.00008
                                                                1078.08
                                                                           0.00100
                                                                                      485.20
                                                                                                0.05000
                                                                                                            348.47
                     OPTIMIZATION SYSTEM FOR TPSSYM = 11
 TOTAL NUMBER OF DESIGN VARIABLES =
                                        36
 TOTAL NUMBER OF CONSTRAINS = 1196
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
       0.1425E+04
   1.0 B
                            В
                                       В
                                                 В
                                                            В
                                                                       В
                                                                                            В
                                                                                                                 В
       D
                 D
                                                                                                                            В
                            D
                                                            D
                                                                      D
                                                                                 D
                                                                                                                            D
   0 0
  -1.0 -
       . 0.8
                                             .38
                                                                .58 .68
TIME ( X 1.401E-44 )
                                                                                                .78
                                                                                                                          .98
               MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:
        2300.33 2300.33
                            550.33
                                     600.33
Tmax:
                1425.15
                            549.84
                     VALUES OF DESIGN VARIABLES :
         DEV01
                DEV02
0.01000
                          DEV03
0.01000
                                   DEV04
0.01000
                                             DEV05
0.01000
                                                      DEV06
0.01000
                                                                  DEV07
       0.01000
                                                                0.01000
                                                                         0.01000
                                                                                   0.01000
      1.30766
                1.15843
                          1.16613 1.41172
                                             1.47614
                                                       1.40625
                                                                1.24850
                                                                          1.25626
                                                                                   1.21618
       0.02776
                0.02951
                          0.02978
                                   0.03979
                                             0.03463
                                                       0.03950
                                                                0.04086
                                                                          0.03060
                                                                                   0.03115
       0.05000 0.05000 0.05000
                                  0.05000
                                            0.05000
                                                       0.05000
                                                                0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4759319
THE TOTAL OPTIMAL WEIGHT = 3.06143389E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.4917E+00
   1.0 A
                         Α
                                                                                Α
                                                                                                  Α
                                                                                                                    Α
```

```
-1.0
                                                      .54 .64 .74
TIME (X 1.401E-44)
     .14
                 . 24
                              .34
                                          .44
                                                                                           .84
                                                                                                        .94
                                                                                                                    1.04
                                                                                                                              1.14
            OPTIMAL STRUCTURES OF TPS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
HRSI COAT
                                          thin skin
                                                                0.01000 in. 1425.2 F
-----
                                                               ----
                     LI-900 (P)
                                           slab
                                                                1.29418 in. 1425.2 F
                     RTV-560
                                          thin skin
                                                                0.03373 in. 549.8 F
                     17 LB SIP .16 IN slab
                                                                0.05000 in. 549.8 F
______
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
 PANEL
        LAYER01
                              LAYER02
                                                  LAYER03
                                                                       LAYER04
                   1214.08 1.34207
1235.72 1.37045
  1071
         0.01000
                                        1214 08
                                                  0.03655
                                                              550.33 0.05000
                                                                                  549 25
          0.01000
                                                  0.03778
                                                                       0.05000
   1072
                                        1235.72
                                                              550.33
                                                                                  549.15
  1073
          0.01000
                    1251.72
                              1.39176
                                        1251.72
                                                  0.03871
                                                              550.33
                                                                       0.05000
                                                                                  549 07
  1074
          0.01000
                    1262.08
                              1.40599
                                        1262.08
                                                  0.03935
                                                              550.33
                                                                       0.05000
                                                                                  549.02
  1075
          0.01000
                    1266.80
                             1.41315
                                        1266.80
                                                  0.03970
                                                              550.33
                                                                       0.05000
                                                                                  548.99
  1076
          0.01000
                    1265.88
                             1.41324
                                        1265.88
                                                  0.03975
                                                              550.33
                                                                       0.05000
                                                                                  548.99
                    1259.33
                                        1259.33
                                                              550.33
   1077
          0.01000
                             1.40625
                                                   0.03950
                                                                       0.05000
                                                                                  549.01
  1078
          0.01000
                    1248.30
1230.54
                             1.39724
1.37910
                                        1248.30
                                                   0.03859
                                                              550.33
                                                                       0.05000
                                                                                  549.06
   1079
                                        1230.54
                                                   0.03750
                                                              550.33
                                                                       0.05000
          0.01000
                                                                                  549.14
  1080
          0.01000
                    1206.05
                              1.35179
                                        1206.05
                                                   0.03625
                                                              550.33
                                                                       0.05000
                                                                                  549.23
          0.01000
                    1226.71
                              1.37868
                                                              550.33
                                                                       0.05000
                                                                                  549.27
  1081
                                        1226.71
                                                   0.03460
  1082
          0.01000
                    1251.15
                              1.41533
                                        1251.15
                                                   0.03526
                                                              550.33
                                                                       0.05001
                                                                                  549.18
  1083
          0.01000
                    1269 37
                              1.44436
                                        1269 37
                                                  0.03563
                                                              550 33
                                                                       0.05001
                                                                                  549 12
   1084
          0.01000
                    1281.17
                              1.46539
                                        1281.17
                                                   0.03573
                                                              550.33
                                                                       0.05001
                                                                                  549.08
  1085
          0.01000
                    1286.44
                              1.47806
                                        1286.44
                                                   0.03558
                                                              550.33
                                                                       0.05001
                                                                                  549 07
                                                                       0.05001
          0.01000
                    1285.13
                              1.48192
                                        1285.13
                                                   0.03520
                                                              550.33
                                                                                  549.07
   1086
  1087
          0 01000
                    1277 42
                              1.47649
                                        1277.42
                                                   0 03464
                                                              550.33
                                                                       0.05001
                                                                                  549 10
                    1263.23
                              1.45787
                                        1263.23
                                                                       0.05001
                                                                                  549.15
  1088
          0.01000
                                                   0.03420
                                                              550.33
   1089
          0.01000
                    1243.54
                              1.43015
                                        1243.54
                                                   0.03362
                                                              550.33
                                                                       0.05001
                                                                                  549.21
  1090
          0.01000
                    1218.85
                              1.39341
                                        1218.85
                                                  0.03293
                                                              550.33
                                                                       0.05001
                                                                                  549.29
  1091
          0.01000
                    1237.16
1258.75
                              1.41781
                                        1237.16
                                                   0.03324
                                                              550.33
                                                                       0.05001
                                                                                  549.24
  1092
          0.01000
                              1.45337
                                        1258 75
                                                   0 03374
                                                              550 33
                                                                       0.05001
                                                                                  549 16
                    1273.61
                              1.47939
                                        1273.61
                                                              550.33
                                                                       0.05001
  1093
          0.01000
                                                   0.03408
                                                                                  549.11
   1094
          0.01000
                    1281.90
                              1.49554
                                        1281.90
                                                   0.03429
                                                              550.33
                                                                       0.05002
                                                                                  549.08
  1095
          0.01000
                    1284.01
                              1.50145
                                        1284.01
                                                   0.03440
                                                              550.33
                                                                       0.05002
                                                                                  549.06
   1096
          0.01000
                    1280.83
                              1.49665
                                        1280.83
                                                   0.03445
                                                              550.33
                                                                       0.05002
                                                                                  549.07
  1097
          0.01000
                    1274.39
                              1.48072
                                        1274.39
                                                   0.03453
                                                              550.33
                                                                       0.05002
                                                                                  549.09
                    1269.21
                              1.46138
   1098
          0.01000
                                        1269.21
                                                   0.03416
                                                              550.33
                                                                       0.05001
                                                                                  549.14
                                        1263.23
1258.38
  1099
          0.01000
                    1263.23
                              1.43502
                                                   0.03366
                                                              550.33
                                                                       0.05001
                                                                                  549.21
                    1258.38
                                                                       0.05001
   1100
          0.01000
                              1.40256
                                                   0.03300
                                                              550.33
                                                                                  549.30
   1101
          0.01000
                    1228.67
                              1.41443
                                        1228.67
                                                   0.03509
                                                              550.33
                                                                       0.05001
                                                                                  549.11
  1102
          0.01000
                    1242.10
                              1.44236
                                        1242.10
                                                   0.03576
                                                              550.33
                                                                       0.05001
                                                                                  549.05
   1103
          0.01000
                    1249.57
                              1.45930
                                        1249.57
                                                   0.03640
                                                              550.33
                                                                       0.05001
                                                                                  549.00
  1104
          0.01000
                    1251 86
                              1 46490
                                        1251 86
                                                   0 03705
                                                              550 33
                                                                       0.05001
                                                                                  548 97
   1105
          0.01000
                    1250.43
                              1.45886
                                        1250.43
                                                   0.03778
                                                              550.33
                                                                       0.05001
                                                                                  548.95
                    1248.12
1250.76
                              1.44100
1.41172
                                        1248.12
1250.76
                                                              550.33
550.33
                                                                       0.05001
0.05000
  1106
          0.01000
                                                   0.03865
                                                                                  548.95
   1107
          0.01000
                                                   0.03979
                                                                                  548.97
  1108
          0.01000
                    1269.72
                              1.40789
                                        1269.72
                                                   0.03860
                                                              550.33
                                                                       0.05000
                                                                                  549.05
  1109
          0.01000
                    1291.14
                              1.39999
                                        1291.14
                                                   0.03720
                                                              550.33
                                                                       0.05000
                                                                                  549.15
                    1315.03
                              1.38800
                                        1315.03
                                                   0.03558
                                                              550.33
                                                                       0.05000
                                                                                  549.27
   1110
          0.01000
  1126
          0.01000
                    1116.63
                              1.21618
                                        1116.63
                                                  0.03115
                                                              550.33
                                                                       0.05000
                                                                                  549.69
   1127
          0.01000
                    1136.20
                              1.24133
                                        1136.20
                                                   0.03223
                                                              550.33
                                                                       0.05000
                                                                                  549.60
  1128
          0.01000
                    1156.01
                              1.26684
                                        1156.01
                                                   0.03332
                                                              550.33
                                                                       0.05000
                                                                                  549.51
  1129
          0.01000
                    1175.16
                              1.29156
                                        1175.16
                                                   0.03437
                                                              550.33
                                                                       0.05000
                                                                                  549.43
   1130
          0.01000
                    1192.92
                              1.31456
                                        1192.92
                                                   0.03536
                                                              550.33
                                                                       0.05000
                                                                                  549.34
  1131
          0.01000
                    1131.61
                              1.25626
                                        1131.61
                                                   0.03060
                                                              550.33
                                                                       0.05000
                                                                                  549.59
   1132
                    1144.42
                              1.26961
                                        1144.42
                                                   0.03116
                                                              550.33
                                                                       0.05000
                                                                                  549.58
  1133
          0.01000
                    1161 04
                              1 28467
                                        1161 04
                                                   0 03243
                                                              550 33
                                                                       0.05000
                                                                                  549 51
                    1179.81
                              1.30689
                                                   0.03355
                                                              550.33
                                                                       0.05000
                                                                                  549.43
   1134
          0.01000
                                        1179.81
                              1.33914
1.26852
  1135
          0.01000
                    1201.14
                                        1201.14
                                                   0.03408
                                                              550.33
                                                                       0.05000
                                                                                  549.35
          0.01000
                    1156.70
                                        1156.70
                                                              550.33
                                                                       0.05000
  1136
                                                   0.03377
                                                                                  549.35
  1137
          0.01000
                    1161.85
                              1.29618
                                        1161.85
                                                   0.03228
                                                              550.33
                                                                       0.05000
                                                                                  549.42
                              1.32353
1.35151
  1138
          0.01000
                    1176.37
                                        1176.37
                                                   0.03196
                                                              550.33
                                                                       0.05000
                                                                                  549.42
                    1194.83
                                        1194.83
                                                                       0.05001
   1139
          0.01000
                                                   0.03224
                                                              550.33
                                                                                  549.38
  1140
          0.01000
                    1214.44
                              1.38146
                                        1214.44
                                                   0.03270
                                                              550.33
                                                                       0.05001
                                                                                  549.31
                    1191.02
                                        1191.02
                                                                       0.05000
          0.01000
                              1.24850
                                                   0.04086
                                                              550.33
                                                                                  548.97
   1141
  1142
          0.01000
                    1180.35
                              1.28166
                                        1180.35
                                                   0.03767
                                                              550.33
                                                                       0.05000
                                                                                  549.11
                                                  0.03575
                                                              550.33
                                                                       0.05000
  1143
          0.01000
                    1184.48
                              1.31641
                                        1184.48
                                                                                  549.18
                                                                       0.05001
  1145
          0.01000
                    1212.18
                              1.38207
                                        1212.18
                                                  0.03466
                                                              550.33
                                                                       0.05001
                                                                                  549.17
```

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1158
       0.01000
                  1116.63
                            1.21618
                                       1116.63
                                                  0.03115
                                                              550.33
                                                                       0.05000
                                                                                    549.69
1159
       0.01000
                  1116.63
                             1.21618
                                        1116.63
                                                  0.03115
                                                              550.33
                                                                        0.05000
                                                                                    549.69
1160
       0.01000
                  1116.63
                             1 21618
                                        1116.63
                                                  0.03115
                                                              550 33
                                                                        0.05000
                                                                                    549 69
                             1.22055
                                                                                    549.69
1161
       0.01000
                  1117.57
                                        1117.57
                                                  0.03098
                                                              550.33
                                                                        0.05000
1162
       0.01000
                  1131.61
                             1.25626
                                        1131.61
                                                  0.03060
                                                              550.33
                                                                        0.05000
                                                                                    549.59
                             1.25626
       0.01000
                  1131.61
                                        1131.61
                                                  0.03060
                                                              550.33
                                                                        0.05000
                                                                                    549.59
1163
1164
       0.01000
                  1131.61
                             1.25626
                                        1131.61
                                                  0.03060
                                                              550.33
                                                                        0.05000
                                                                                    549.59
1165
       0.01000
                  1134.32
                             1.25962
                                        1134.32
                                                  0.03079
                                                              550.33
                                                                        0.05000
                                                                                    549.57
1166
       0.01000
                  1143.64
                             1.26666
                                        1143.64
                                                  0.03178
                                                              550.33
                                                                        0.05000
                                                                                    549.48
1167
       0.01000
                  1147.79
                             1.26805
                                        1147.79
                                                  0.03235
                                                              550.33
                                                                        0.05000
                                                                                    549.44
                  1153.08
1168
       0.01000
                             1.26865
                                        1153.08
                                                  0.03317
                                                              550.33
                                                                        0.05000
                                                                                    549.39
1169
       0.01000
                  1161.64
                             1.26736
                                        1161.64
                                                  0.03466
                                                              550.33
                                                                        0.05000
                                                                                    549.30
1170
       0.01000
                  1177.46
                             1.25945
                                        1177.46
                                                  0.03783
                                                              550.33
                                                                        0.05000
                                                                                    549.13
       0.01000
                  1188.50
                             1.25077
                                        1188.50
                                                  0.04028
                                                              550.33
                                                                        0.05000
1172
       0.01000
                  1191.02
                             1.24850
                                       1191.02
                                                  0.04086
                                                              550.33
                                                                        0.05000
                                                                                    548.97
1173
                  1191.02
                             1.24850
                                                              550.33
       0.01000
                                        1191.02
                                                  0.04086
                                                                        0.05000
                                                                                    548.97
1348
       0.01000
                  1335.64
                             1.37563
                                       1335.64
                                                  0.03416
                                                              550.33
                                                                        0.05000
                                                                                    549.37
                             1.37275
                                                              550.33
                                                                        0.05001
1349
       0.01000
                  1254.33
                                        1254.33
                                                  0.03229
                                                                                    549.39
1350
       0.01000
                  1194.70
                             1.35652
                                        1194.70
                                                  0.03233
                                                              550.33
                                                                        0.05001
                                                                                    549.37
1351
       0.01000
                  1181.40
                             1.32255
                                        1181.40
                                                  0.03515
                                                              550.33
                                                                        0.05000
                                                                                    549.32
       0.01000
                  1351.81
                                                  0.03303
                                                                        0.05000
                                                                                    549.45
1355
                             1.36487
1356
       0.01000
                  1247.81
                             1.34716
                                       1247.81
                                                  0.03163
                                                              550.33
                                                                        0.05001
                                                                                    549.46
1357
       0.01000
                  1172.67
                             1.32370
                                        1172.67
                                                  0.03186
                                                              550.33
                                                                        0.05001
1358
       0.01000
                  1159.88
                             1.29594
                                       1159.88
                                                  0.03426
                                                              550.33
                                                                        0.05000
                                                                                    549 40
       0.01000
                  1368.78
                             1.35275
                                        1368.78
                                                  0.03182
                                                              550.33
                                                                        0.05000
                                                                                    549.54
1362
1363
       0.01000
                  1240.31
                             1.31877
                                        1240.31
                                                  0.03094
                                                              550.33
                                                                        0.05001
                                                                                    549.53
1364
       0.01000
                  1148.46
                             1.28760
                                       1148.46
                                                  0.03134
                                                              550.33
                                                                        0.05001
                                                                                    549.51
                                                              550.33
1365
       0.01000
                  1136.08
                             1.26631
                                        1136.08
                                                  0.03329
1369
       0.01000
                  1377.89
                             1.33657
                                       1377.89
                                                  0.03053
                                                              550.33
                                                                        0.05000
                                                                                    549.63
                  1231.30
                             1.28750
                                        1231.30
1370
       0.01000
                                                  0.03020
                                                              550.33
                                                                        0.05000
                                                                                    549.62
1371
       0.01000
                  1121.96
                             1.24817
                                        1121.96
                                                  0.03076
                                                              550.33
                                                                        0.05000
                                                                                    549.59
                             1.23380
1372
       0.01000
                  1110.29
                                                              550.33
                                                                        0.05000
                                        1110.29
                                                  0.03222
                                                                                    549.59
1376
       0.01000
                  1406.47
                             1.32332
                                        1406.47
                                                  0.02912
                                                              550.33
                                                                        0.05000
                                                                                    549.74
1377
       0.01000
                  1220.67
                             1.25322
                                       1220.67
                                                  0.02943
                                                              550.33
                                                                        0.05000
                                                                                    549.70
       0.01000
                  1093.05
                             1.20531
                                        1093.05
                                                  0.03012
                                                                        0.05000
1379
       0.01000
                  1082 67
                             1 19869
                                       1082 67
                                                  0 03105
                                                              550 33
                                                                        0.05000
                                                                                    549 69
1383
       0.01000
                  1425.15
                             1.30766
                                        1425.15
                                                  0.02776
                                                              550.33
                                                                        0.05000
                                                                                    549.84
1384
       0.01000
                  1182.65
                             1.20782
                                       1182.65
                                                  0.02881
                                                              550.33
                                                                        0.05000
                                                                                    549.79
1385
       0.01000
                  1055.77
                             1.15843
                                        1055.77
                                                  0.02951
                                                              550.33
                                                                        0.05000
                                                                                    549.78
1386
       0.01000
                  1061.07
                             1.16613
                                       1061.07
                                                  0.02978
                                                              550.33
                                                                        0.05000
                                                                                    549.81
```

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 996
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER LAYER: 1 2 3 4 4 Tmax: 2300.33 2300.33 550.33 600.33 Optv: 1246.96 1246.96 550.14 550.14

VALUES OF DESIGN VARIABLES : LAYER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 1.16452 1.16872 1.15166 1.58434 1.35072 1.24258 1.16777 1.14984 1.13925 0.03045 0.03064 0.01750 0.03675 0.04225 0.03053 0.03322 0.03308 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 222.6478729

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4537162

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.6806E+00
  1.0 +
               A A A A A A A A A A A A A A A
                                                                       A A A A A A A A A A A A A A A A
  0.0
  -1.0 -
            .12 .22 .32 .42 .52 .62
TIME ( X 5.605E-44 )
      .02
                                                                                                               .92
 OPTIMAL STRUCTURES OF TPS FOR PATCH = 12
(WITH AVERAGE THICKNESS)
                                                             0.01000 in. 1247.0 F
                   HRSI COAT
                                 thin skin
                     LI-900 (P)
                                                              1.23548 in. 1247.0 F
                     RTV-560
                                        thin skin
                                                              0.03192 in. 550.1 F
 ______
                                                             ----
                     17 LB SIP .16 IN slab
                                                              0.05000 in. 550.1 F
 _____
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANET.
         LAYER01
                             LAYER02
                                                 LAYER03
                                                                    LAYER04
   1041
          0.01000
                   1148.16
                             1.20468
                                      1148.16
                                                 0.03902
                                                            550.33
                                                                    0.05000
                                                                               549.33
   1042
          0.01000
                    1165.90
1179.32
                             1.21969
                                       1165.90
                                                 0.04042
                                                            550.33
                                                                    0.05000
                                                                               549.16
549.03
                                                 0.04149
          0.01000
                             1.23121
                                       1179.32
                                                            550.33
   1043
                                                                    0.05000
   1044
          0.01000
                    1188.40
                             1.23923
                                       1188.40
                                                 0.04221
                                                            550.33
                                                                    0.05000
                                                                               548.94
   1045
          0.01000
                    1193.11
                             1.24378
                                       1193.11
                                                 0.04258
                                                            550.33
                                                                    0.05000
                                                                               548.90
                            1.24487
   1046
          0.01000
                    1193.42
                                       1193.42
                                                 0.04260
                                                            550.33
                                                                    0.05000
                                                                               548.90
   1047
          0.01000
                    1189.29
                                       1189 29
                                                 0.04225
                                                            550 33
                                                                    0.05000
                                                                               548 90
                             1.24294
                                                 0.04171
                                                            550.33
                                                                    0.05000
   1048
          0.01000
                    1184.58
                                       1184.58
                                                                               548.90
    1049
          0.01000
                    1175.85
                             1.24141
                                       1175.85
                                                 0.04068
                                                            550.32
                                                                    0.05000
                                                                               548.94
                    1162.91
                                                                    0.05000
   1050
          0.01000
                             1.23757
                                       1162.91
                                                 0.03918
                                                            550.32
                                                                               549.03
    1051
          0.01000
                    1164.70
                             1.26419
                                       1164.70
                                                 0.03610
                                                            550.32
                                                                    0.05000
   1052
          0.01000
                    1185.63
                             1.29477
                                       1185.63
                                                 0.03656
                                                            550.31
                                                                    0.05000
                                                                               549.23
                    1201.86
                             1.31976
    1053
          0.01000
                                       1201.86
                                                 0.03680
                                                            550.31
                                                                    0.05000
                                                                               549.10
   1054
          0.01000
                    1213.33
                             1.33852
                                       1213.33
                                                 0.03690
                                                            550.31
                                                                    0.05000
                                                                               549.02
                                       1219.92
          0.01000
                    1219.92
                             1.35027
   1055
                                                 0.03689
                                                            550.31
                                                                    0.05000
                                                                               548.96
    1056
          0.01000
                    1221.57
                              1.35448
                                       1221.57
                                                 0.03683
                                                            550.31
                                                                    0.05000
                                                                               548.93
   1057
          0.01000
                    1218.22
                             1.35067
                                       1218.22
                                                 0.03675
                                                            550.31
                                                                    0.05000
                                                                               548.93
                                       1212.33
    1058
          0.01000
                    1212.33
                             1.35475
                                                 0.03546
                                                            550.31
                                                                    0.05000
                                                                               549.01
   1059
          0.01000
                    1201 26
                             1 35092
                                       1201 26
                                                 0.03411
                                                            550 31
                                                                    0.05000
                                                                               549 13
    1060
          0.01000
                    1184.86
                             1.33780
                                       1184.86
                                                 0.03281
                                                            550.31
                                                                    0.05000
                    1187.92
1211.55
                             1.38274
1.44609
                                       1187.92
1211.55
                                                 0.02732
0.02494
                                                                    0.05000
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549.94
   1061
          0.01000
                                                            550.32
                                                            550.32
    1062
          0.01000
   1063
          0.01000
                    1229.85
                              1.50008
                                       1229.85
                                                 0.02262
                                                            550.33
                                                                    0.05000
                                                                               549.98
   1064
          0.01000
                    1242.67
                             1.54273
                                       1242.67
                                                 0.02056
                                                            550.33
                                                                    0.05000
                                                                               550.04
          0.01000
    1065
                    1246.96
                             1.57210
                                       1246.96
                                                            550.33
                                                 0.01892
                                                                               550.09
   1066
          0.01000
                    1246.96
                             1.58649
                                       1246.96
                                                 0.01785
                                                            550.33
                                                                    0.05000
                                                                               550.12
    1067
          0.01000
                    1246.96
                             1.58434
                                       1246.96
                                                 0.01750
                                                            550.33
                                                                    0.05000
                                                                               550.14
   1068
          0.01000
                    1236.61
                             1.56397
                                       1236.61
                                                 0.01801
                                                            550.33
                                                                    0.05000
                                                                               550.11
   1069
          0.01000
                    1220.79
                              1.52999
                                       1220.79
                                                 0.01899
                                                            550.33
                                                                    0.05000
                                                                               550.09
    1070
          0.01000
                    1199.48
                              1.48241
                                       1199.48
                                                 0.02043
                                                            550.33
                                                                    0.05000
                                                                               550.05
   1111
          0.01000
                    1070.70
                             1.13925
                                       1070.70
                                                 0.03286
                                                            550.33
                                                                    0.05000
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    1112
                    1087.10
                                       1087.10
                                                 0.03419
                                                            550.33
   1113
          0.01000
                    1103 05
                             1.16639
                                       1103 05
                                                 0.03546
                                                            550 33
                                                                    0.05000
                                                                               549 76
                             1.17961
                                                 0.03663
                                                            550.33
                                                                    0.05000
                                                                               549.62
    1114
          0.01000
                    1118.14
                                       1118.14
   1115
          0.01000
                    1131.63
                             1.19104
                                       1131.63
                                                 0.03769
                                                            550.33
                                                                    0.05000
                                                                               549.49
                    1078.27
   1116
          0.01000
                             1.14984
                                       1078.27
                                                 0.03308
                                                            550.33
                                                                    0.05000
                                                                               550.08
   1117
          0.01000
                    1095.94
                             1.17350
                                       1095.94
                                                 0.03368
                                                            550.33
                                                                    0.05000
                                                                               549.94
   1118
          0.01000
                    1114.15
                             1.19849
                                       1114.15
                                                 0.03420
                                                            550.32
                                                                    0.05000
                                                                               549.80
                    1131.63
                              1.22353
                                                 0.03460
                                                            550.32
                                                                    0.05000
    1119
          0.01000
                                       1131.63
                                                                               549.68
   1120
          0.01000
                    1146.37
                              1.24173
                                       1146.37
                                                 0.03526
                                                            550.32
                                                                    0.05000
                                                                               549.55
          0.01000
                    1098.14
                              1.16777
                                                            550.33
                                                                    0.05000
                                       1098.14
                                                 0.03322
                                                                               550.06
    1121
   1122
          0.01000
                    1112.34
                              1.20801
                                       1112.34
                                                 0.03199
                                                            550.33
                                                                    0.05000
                                                                               550.04
          0.01000
                    1129.76
                              1.24675
                                                            550.33
                                                                    0.05000
   1123
                                       1129.76
                                                 0.03118
                                                                               549.99
          0.01000
                                       1148.50
                                                                    0.05000
   1125
          0.01000
                    1166.20
                             1.32995
                                       1166.20
                                                 0.02896
                                                            550.32
                                                                    0.05000
                                                                               549.93
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1147
          0.01000
                    1070.70
                             1.13925
                                       1070.70
                                                 0.03286
                                                            550.33
                                                                     0.05000
                                                                                550.05
   1148
          0.01000
                    1070.70
                             1 13925
                                       1070.70
                                                 0.03286
                                                            550 33
                                                                     0.05000
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                    1070.70
                                        1070.70
   1149
          0.01000
                              1.13925
                                                 0.03286
                                                            550.33
                                                                     0.05000
                                                                                550.05
                    1078.27
                              1.14984
                                       1078.27
   1150
          0.01000
                                                 0.03308
                                                            550.33
                                                                     0.05000
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                    1078.27
                                        1078.27
   1151
          0.01000
                              1.14984
                                                 0.03308
                                                            550.33
                                                                     0.05000
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   1152
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                              1.14984
                                        1078.27
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                                                            550.33
                                                                     0.05000
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   1153
          0.01000
                    1078.27
                              1.14984
                                       1078.27
                                                 0.03308
                                                            550.33
                                                                     0.05000
                                                                                550.08
   1154
          0.01000
                    1085.93
                              1.15718
                                        1085.93
                                                 0.03315
                                                            550.33
                                                                     0.05000
   1155
          0.01000
                    1088.16
                              1.15919
                                       1088.16
                                                 0.03317
                                                            550.33
                                                                     0.05000
                                                                                550.07
                                                                                550.07
   1156
          0.01000
                    1094.27
                              1.16450
                                       1094.27
                                                 0.03320
                                                            550.33
                                                                     0.05000
   1157
          0.01000
                    1098.14
                              1.16777
                                        1098.14
                                                 0.03322
                                                            550.33
                                                                     0.05000
                                                                                550.06
   1352
          0.01000
                    1178.17
                              1.43380
                                       1178.17
                                                 0.02194
                                                            550.33
                                                                     0.05000
                                                                                550.02
          0.01000
                    1167.02
                                                 0.03213
                                                            550.32
                                                                     0.05000
    1353
                                        1167.02
                    1147.72
   1354
          0.01000
                              1.22855
                                       1147.72
                                                 0.03775
                                                            550.32
                                                                     0.05000
                                                                                549.16
    1359
                    1159.35
                              1.39040
                                        1159.35
                                                 0.02330
                                                            550.33
          0.01000
                                                                     0.05000
                                                                                550.00
   1360
          0.01000
                    1150.35
                              1.29085
                                       1150.35
                                                 0.03196
                                                            550.32
                                                                     0.05000
                                                                                549.45
                              1.21562
                                                            550.32
                                                                     0.05000
   1361
          0.01000
                    1132.23
                                       1132.23
                                                 0.03663
                                                                                549.28
   1366
          0.01000
                    1138.38
                              1.34166
                                       1138.38
                                                 0.02484
                                                            550.33
                                                                     0.05000
                                                                                549.97
   1367
          0.01000
                    1131.75
                              1.26294
                                       1131.75
                                                 0.03176
                                                            550.32
                                                                     0.05000
                                                                                549.54
          0.01000
                    1114.95
                              1.20154
                                                                                549.41
    1368
                                                 0.03535
   1373
          0.01000
                    1115.30
                             1.28767
                                       1115.30
                                                 0.02657
                                                            550.33
                                                                     0.05000
                                                                                549.94
    1374
          0.01000
                    1111.27
                              1.23270
                                        1111.27
                                                 0.03148
                                                            550.32
                                                                     0.05000
   1375
          0.01000
                    1095.87
                              1.18640
                                       1095 87
                                                 0 03391
                                                            550.33
                                                                     0.05000
                                                                                549 56
   1380
          0.01000
                    1090.01
                              1.22801
                                       1090.01
                                                 0.02849
                                                            550.33
                                                                     0.05000
                                                                                549.90
    1381
          0.01000
                    1088.93
                              1.20089
                                        1088.93
                                                 0.03106
                                                            550.33
                                                                     0.05000
   1382
          0.01000
                    1075.09
                              1.17046
                                       1075.09
                                                 0.03230
                                                            550.33
                                                                     0.05000
                                                                                549.73
                    1063.04
                                        1063.04
                                                            550.33
                                                                     0.05000
    1387
          0.01000
                              1.16452
                                                 0.03053
   1388
          0.01000
                    1065.03
                              1.16872
                                       1065.03
                                                 0.03045
                                                            550.33
                                                                     0.05000
                                                                                549.90
                                                            550.33
   1389
          0.01000
                    1051.35
                             1.15166
                                        1051.35
                                                 0.03064
                                                                     0.05000
                                                                               549.89
                   OPTIMIZATION SYSTEM FOR TPSSYM = 13
 TOTAL NUMBER OF DESIGN VARIABLES = 36
 TOTAL NUMBER OF CONSTRAINS = 2040
TOTAL NUMBER OF TEMP. CONSTRAINS = 1440
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1418E+04
  1.0 B
         в в в в в
                       В
                          B B B B B B B
                                                                                 A B B B
        D D D D D
                            A A A B
                                                     0.0
  -1.0 +
      .03
                 .13
                            .23
                                         .33
                                                           .53 .63
TIME ( X 5.605E-44 )
                                                                                        .73
                                                                                                    .83
                                                                                                                .93
                                                                                                                         1.03
              MAXIMUM TEMPERATURE OF EVERY LAYER
      1 2 3 4
2300.33 2300.33 550.33 600.33
LAYER:
Tmax:
       1417.77 1417.77
                        550.00
                                 550.00
                   VALUES OF DESIGN VARIABLES :
LAYER
        DEV01
                 DEV02
                         DEV03
                                  DEV04
                                           DEV05
                                                    DEV06
                                                             DEV07
                                                                      DEV08
                                                                              DEV09
      0.01000
               0.01000
                        0.01000
                                0.01015
                                         0.01000
                                                 0.01000
                                                           0.01000
                                                                   0.01000
                                                                            0.01000
      1.28395
               1.03009
                        1.02402
                                1.31879
                                         1.22340
                                                  1.19037
                                                           1.50502
                                                                    1.49693
                                                                            1.49431
      0.02062
               0.04959
                        0.05020
                                 0.03379
                                         0.03573
                                                  0.03652
                                                           0.00118
                                                                    0.00115
                                                                             0.00115
      0.05000
               0.05000 0.05000 0.05000
                                         0.05000
                                                  0.05000
                                                           0.05000
                                                                    0.05000
                                                                             0.05000
 THE ORIGINAL OBJECTIVE FUNCTION =
 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4470765
THE TOTAL OPTIMAL WEIGHT = 2.38048271E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
       0.3795E+01
   Х
  1.0 +
```

1146

0.01000

1070.70

1.13925

1070.70

0.03286

550.33

0.05000

550.05

```
Α
                                                          Α
  0.0
 -1.0 +
      14
                . 24
                              .34
                                           .44
                                                                                            .84
                                                                                                         .94
                                                                                                                     1.04
                                                                                                                               1.14
                                                            TIME ( X 1.401E-44 )
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                   (WITH AVERAGE THICKNESS)
                     HRST COAT
                                           thin skin
                                                                 0.01002 in. 1417.8 F
_____
                                                                 ----
                      T-T-900 (P)
                                                                 1.28521 in. 1417.8 F
                                           slab
_____
                      RTV-560
                                           thin skin
                                                                 0.02555 in. 550.0 F
_____
                                                                 0.05000 in. 550.0 F
                      17 LB SIP .16 IN
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                               13
 PANET.
         T AVED 0.1
                              LAYER02
                                                   T VALDU3
                                                                       LAYER04
                    1379.15
1362.72
  1686
          0.01009
                              1.42635
1.42068
                                        1379.15
                                                   0.01795
                                                              550.33
                                                                       0.05000
                                                                                   544.20
                                        1362.72
                                                   0.01611
   1687
          0.01004
                                                               550.33
                                                                       0.05000
                                                                                   543.83
  1688
          0.01000
                    1343.70
1330.08
                             1.40728
1.38750
                                        1343.70
                                                   0.01471
0.01479
                                                              550.33
                                                                       0.05000
                                                                                   543.46
          0.01000
                                         1330.08
                                                               550.33
   1689
                                                                                   543.26
   1694
          0.01011
                    1394.12
1374.29
                              1.40345
                                         1394.12
                                                   0.02231
                                                               550.33
                                                                       0.05000
                                                                                   542.80
   1695
          0.01005
                                         1374.29
                                                   0.02026
                                                               550.33
                                                                       0.05000
                              1.39448
                                                                                   542.61
   1696
          0.01000
                    1352.36
                              1.37688
                                         1352.36
                                                   0.01882
                                                               550.32
                                                                       0.05000
                                                                                   542.36
   1697
          0.01000
                    1336 29
                              1 35269
                                         1336 29
                                                   0.01899
                                                              550 33
                                                                       0.05000
                                                                                   542 10
   1702
          0.01013
                    1405.68
                              1.38254
                                         1405.68
                                                   0.02598
                                                               550.33
                                                                       0.05000
                                                                                   541.70
                              1.36879
1.34655
   1703
          0.01006
                    1382.92
                                         1382.92
                                                   0.02395
                                                               550.33
                                                                       0.05000
                                                                                   541 66
                                         1359.02
                                                   0.02267
                                                                        0.05000
   1704
          0.01000
                    1359.02
                                                               550.32
                                                                                   541.50
   1705
          0.01000
                    1341.18
                              1.31864
                                         1341.18
                                                   0 02296
                                                               550.33
                                                                       0.05000
                                                                                   541 20
   1710
                                                   0.02897
                                                                       0.05000
          0.01014
                    1413.82
                              1.36362
                                         1413.82
                                                               550.33
                                                                                   540.90
   1711
          0.01006
                    1388.61
                              1.34340
                                         1388.61
                                                   0.02720
                                                               550.32
                                                                        0.05000
                                                                                   540.99
   1712
          0.01000
                    1363.64
                              1.31617
                                         1363.64
                                                   0.02627
                                                              550.32
                                                                       0.05000
                                                                                   540.89
   1713
          0.01000
                    1344.72
1417.77
                              1.28532
                                         1344.72
                                                   0.02671
                                                               550.33
                                                                       0.05000
                                                                                   540.56
   1718
          0.01015
                              1.34669
                                         1417.77
                                                   0 03126
                                                               550.33
                                                                       0.05000
                                                                                   540 39
   1719
                    1391.43
                                         1391.42
                                                              550.32
                                                                       0.05000
          0.01006
                              1.31802
                                                   0.03006
                                                                                   540.59
   1720
          0.01000
                    1366.23
                               1.28559
                                         1366.23
                                                   0.02963
                                                               550.32
                                                                        0.05000
                                                                                   540.53
   1721
          0.01000
                    1346.91
                              1.25275
                                         1346.91
                                                   0.03022
                                                               550.33
                                                                       0.05000
                                                                                   540.17
   1726
          0.01015
                    1417.77
                               1.33175
                                                   0.03287
                                                               550.33
                                                                        0.05000
   1727
          0.01006
                    1391.45
                              1.29233
                                         1391.45
                                                   0.03258
                                                               550.32
                                                                       0.05000
                                                                                   540.46
                              1.25470
   1728
          0.01000
                    1366.83
                                         1366.83
                                                   0.03277
                                                               550.32
                                                                       0.05000
                                                                                   540.43
                    1347.74
1417.77
                                        1347.74
1417.77
   1729
          0.01000
                              1.22103
                                                   0.03350
                                                               550.33
                                                                       0.05000
                                                                                   540.15
   1734
                                                               550.33
                                                                       0.05000
          0.01015
                              1.31879
                                                   0.03379
                                                                                   540.26
   1735
          0.01005
                    1388.82
                               1.26593
                                         1388.82
                                                   0.03482
                                                               550.32
                                                                        0.05000
                                                                                   540.59
   1736
          0.01000
                    1365.51
                              1.22338
                                         1365.51
                                                   0.03573
                                                              550.32
                                                                       0.05000
                                                                                   540.56
   1737
          0.01000
                    1347.26
                               1.19037
                                         1347.26
                                                   0.03652
                                                               550.33
                                                                        0.05000
                                                                                   540.15
   1742
          0 01014
                    1412 14
                              1 30766
                                         1412 14
                                                   0.03402
                                                               550 33
                                                                       0.05000
                                                                                   540 65
   1743
          0.01005
                    1387.53
                              1.24713
                                         1387.53
                                                   0.03652
                                                               550.32
                                                                       0.05000
                                                                                   540.98
  1744
1745
                    1365.14
1347.28
                              1.19688
1.16361
                                         1365.14
1347.28
                                                   0.03837
0.03924
                                                              550.32
550.33
                                                                       0.05000
0.05000
          0.01000
                                                                                   540.99
          0.01000
                                                                                   540.61
   1750
          0.01013
                    1402.93
                               1.29855
                                         1402.93
                                                   0.03354
                                                               550.33
                                                                       0.05000
                                                                                   541.34
                    1383.50
1362.89
   1751
          0.01006
                              1.23147
                                         1383.50
                                                   0.03752
                                                               550.32
                                                                       0.05000
                                                                                   541.63
   1752
          0.01000
                               1.17133
                                         1362.89
                                                   0.04067
                                                               550.32
                                                                        0.05000
                                                                                   541.66
   1753
          0.01000
                    1346.08
                              1.13763
                                         1346.08
                                                   0.04175
                                                              550.33
                                                                       0.05000
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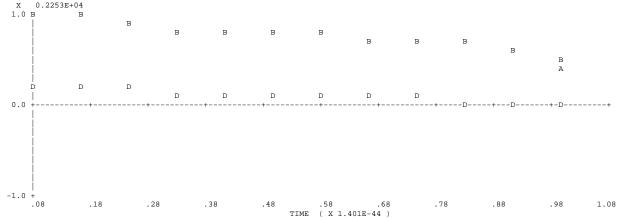
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                                1 14532
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                                                                550.33
                                                                         0.05000
                                                                                     544.33
 TOTAL NUMBER OF DESIGN VARIABLES = 36
 TOTAL NUMBER OF CONSTRAINS
                                  = 1228
 TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1079E+04
   1.0 B
                 В
                            В
                                      В
                                                 В
                                                           В
                                                                     В
                                                                                В
                                                                                           В
                                                                                                               В
                 D
                           D
                                                                                                               Α
                                                                                                                          В
                                      D
                                                           D
                                                                     D
                                                                                                                          Α
                                                                                                     D
                                                                                                               D
                                                                                                                          D
  -1.0
       . 08
                   .18
                                .28
                                            . 38
                                                         .48
                                                                      . 58
                                                                                   . 68
                                                                                               .78
                                                                                                           .88
                                                                                                                        . 98
                                                                                                                                  1.08
                                                               TIME ( X 1.401E-44 )
               MAXIMUM TEMPERATURE OF EVERY LAYER
        1 2 3 4
2300.33 2300.33 550.33 600.33
LAYER:
                                          4
Tmax:
Optv:
        1078.62 1078.62
                           550.24
                                   550 24
                  VALUES OF DESIGN VARIABLES : DEV02 DEV03 DEV04 DEV
LAYER
         DEV01
                                             DEV05
                                                        DEV06
                                                                 DEV07
                                                                          DEV08
      0.01000 0.01000
                         0.01000
                                   0.01000
                                            0.01000
                                                      0.01000
                                                              0.01000
                                                                        0.01000
                                                                                  0.01000
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                1.14778
                         1.14150
                                   1.14414
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                                                      1.00039
                                                               1.11534
                                                                         1.12092
                                                                                  1.11129
                0.03505
                         0.03595
                                   0.03382
                                            0.03217
      0.05000 0.05000
                         0.05000 0.05000
                                            0.05000
                                                      0.05000
                                                               0.05000
                                                                        0.05000
                                                                                  0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                        308.7402344
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4178517
 THE TOTAL OPTIMAL WEIGHT = 2.50893306E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.4379E+01
   1.0 +
                                                           Α
                                                                                          Α
                                                                                                                          Α
```

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А
                                              Α
                                                                              Α
                                                                                                            Α
 -1.0
      .08
                                                            .58 .68
TIME ( X 1.401E-44 )
                 .18
                               .28
                                           .38
                                                        .48
                                                                                 .68
                                                                                             .78
                                                                                                         .88
                                                                                                                      .98
                                                                                                                                1.08
              OPTIMAL STRUCTURES OF TPS FOR PATCH =
                     (WITH AVERAGE THICKNESS)
HRSI COAT
                                           thin skin
                                                                 0.01000 in. 1078.6 F
______
                                                                 ----
                      LI-900 (P)
                                            slab
                                                                 1.11506 in. 1078.6 F
                      RTV-560
                                           thin skin
                                                                 0.03435 in. 550.2 F
                                                                 0.05000 in. 550.2 F
                      17 LB SIP .16 IN
______
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
 PANEL
          LAYER01
                              LAYER02
                                                   LAYER03
                                                                        LAYER04
                              1.14218
1.12721
  1933
          0.01000
                    1078 44
                                         1078 44
                                                   0.03586
                                                               550 33
                                                                        0.05000
                                                                                    550 23
          0.01000
                                                   0.03321
                                                                        0.05000
   1690
                    1064.50
                                         1064.50
                                                               550.33
                                                                                    550.10
   1691
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                                         1052.78
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                                                                        0.05000
                                                                                    550 11
   1692
          0.01000
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                              1.10850
                                         1044.04
                                                   0.03138
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                                                                        0.05000
                                                                                    549.88
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                              1.03966
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                                                   0.03334
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                                                                        0.05000
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                              1.14027
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                                                               550.33
                                                                        0.05000
          0.01000
                                                                                    549.29
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          0.01000
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                                                                        0.05000
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                                                   0.03135
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                                                                        0.05000
                                                                                    549.85
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                                                                                    550.17
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          0.01000
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                    1071.56
                               1.15110
                                                               550.33
                                                                        0.05000
                                                                                    550.20
   1795
          0.01000
                    1069.10
                               1.15325
                                         1069.10
                                                   0.03311
                                                               550.33
                                                                        0.05000
                                                                                    550.17
                                                                        0.05000
   1796
          0.01000
                    1068.17
                                         1068.17
                                                   0.03409
                                                               550.33
                                                                                    550.10
                               1.13913
   1797
          0.01000
                    1069.37
                               1.10398
                                         1069.37
                                                   0.03754
                                                               550.33
                                                                        0.05000
                                                                                    549.96
                    1070.51
                                         1070.51
                                                               550.33
                                                                        0.05000
                                                                                    550.20
   1802
          0.01000
                               1.15131
                                                   0.03402
                    1070.86
                                                                        0.05000
   1804
          0.01000
                    1071.89
                              1.14362
                                         1071.89
                                                   0.03451
                                                               550.33
                                                                        0.05000
                                                                                   550.13
```

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1805
       0.01000
                  1073.78
                            1.12221
                                       1073.78
                                                  0.03675
                                                              550.33
                                                                       0.05000
                                                                                   550.10
1810
       0.01000
                  1069.31
                            1.15141
                                       1069.31
                                                  0.03401
                                                              550.33
                                                                       0.05000
                                                                                   550.21
1811
       0.01000
                  1073.10
                            1 15096
                                       1073 10
                                                  0.03442
                                                              550 33
                                                                       0.05000
                                                                                   550 15
                  1076.18
                                       1076.18
1812
       0.01000
                            1.14778
                                                  0.03505
                                                              550.33
                                                                       0.05000
                                                                                   550.16
1813
       0.01000
                  1078.62
                            1.14150
                                       1078.62
                                                  0.03595
                                                              550.33
                                                                       0.05000
                                                                                   550.24
       0.01000
                  1054.71
                            1.11534
                                       1054.71
                                                  0.03276
                                                              550.33
                                                                       0.05000
                                                                                   550.08
1818
1819
       0.01000
                  1054.02
                             1.12217
                                       1054.02
                                                  0.03227
                                                              550.33
                                                                       0.05000
                                                                                   550.04
1820
       0.01000
                  1052.38
                            1.12092
                                       1052.38
                                                  0.03198
                                                              550.33
                                                                       0.05000
                                                                                   549.97
       0.01000
                  1049.73
                             1.11129
                                       1049.73
                                                  0.03189
                                                              550.33
                                                                       0.05000
                                                                                   549.86
1821
1826
       0.01000
                  1056.76
                            1.11771
                                       1056.76
                                                  0.03285
                                                              550.33
                                                                       0.05000
                                                                                   550 08
                  1053.49
                            1.12491
1827
       0.01000
                                       1053.49
                                                  0.03183
                                                              550.33
                                                                       0.05000
                                                                                   550.06
1828
       0.01000
                  1050.46
                            1.11811
                                       1050.46
                                                  0.03184
                                                              550.33
                                                                       0.05000
                                                                                   549.95
1829
       0.01000
                  1047.61
                            1.09561
                                       1047.61
                                                  0.03299
                                                              550.33
                                                                       0.05000
                                                                                   549.75
       0.01000
                  1058.70
                             1.12000
                                       1058.70
                                                  0.03294
                                                              550.33
1834
                                                                       0.05000
                                                                                   550.09
                  1053.16
1048.75
1835
       0.01000
                            1.12763
                                       1053.16
                                                  0.03144
                                                              550.33
                                                                       0.05000
                                                                                   550.07
                                       1048.75
                                                              550.33
1836
       0.01000
                             1.11596
                                                  0.03168
                                                                       0.05000
                                                                                   549.94
1837
       0.01000
                  1045.69
                            1.08134
                                       1045.69
                                                  0.03399
                                                              550.33
                                                                       0.05000
                                                                                   549.66
                  1060.52
                                                  0.03302
                                                              550.33
                                                                       0.05000
1842
       0.01000
                            1.12220
                                       1060.52
                                                                                   550.09
1843
       0.01000
                  1053.00
                             1.13031
                                       1053.00
                                                  0.03109
                                                              550.33
                                                                       0.05000
                                                                                   550.08
1844
       0.01000
                  1047.21
                            1.11398
                                       1047.21
                                                  0.03154
                                                              550.33
                                                                       0.05000
                                                                                   549.92
       0.01000
                  1043.97
                                       1043.97
                                                  0.03493
                                                                       0.05000
1850
       0.01000
                  1062.24
                            1.12432
                                       1062.24
                                                  0.03310
                                                              550.33
                                                                       0.05000
                                                                                   550.09
1851
       0.01000
                  1052.90
                             1.13290
                                       1052.90
                                                  0.03077
                                                              550.33
                                                                       0.05000
                                                                                   550.10
1852
       0.01000
                  1045.77
                            1.11161
                                       1045.77
                                                  0 03145
                                                              550.33
                                                                       0.05000
                                                                                   549 91
1853
       0.01000
                  1042.57
                            1.05559
                                       1042.47
                                                  0.03584
                                                              550.33
                                                                       0.05000
                                                                                   549.49
1854
       0.01000
                  1049.73
                             1.11129
                                       1049.73
                                                  0.03189
                                                              550.33
                                                                       0.05000
                                                                                   549.86
1855
       0.01000
                  1052.40
                            1.12096
                                       1052.40
                                                  0.03198
                                                              550.33
                                                                       0.05000
                                                                                   549.97
                  1054.02
                                                              550.33
                                                                                   550.04
1856
       0.01000
                             1.12217
                                       1054.02
                                                  0.03227
                            1.11534
1.11129
1857
       0.01000
                  1054.71
                                       1054.71
                                                  0.03276
                                                              550.33
                                                                       0.05000
                                                                                   550.08
                  1049.73
                                       1049.73
1862
       0.01000
                                                  0.03189
                                                              550.33
                                                                       0.05000
                                                                                   549.86
1863
       0.01000
                  1052.45
                            1.12109
                                       1052.45
                                                  0.03199
                                                              550.33
                                                                       0.05000
                                                                                   549.97
                  1054.03
       0.01000
                                       1054.03
                                                              550.33
                                                                       0.05000
                                                                                   550.04
1864
                            1.12214
                                                  0.03227
1865
       0.01000
                  1054.71
                            1.11534
                                       1054.71
                                                  0.03276
                                                              550.33
                                                                       0.05000
                                                                                   550.08
1870
       0.01000
                  1049.73
                            1.11129
                                       1049.73
                                                  0.03189
                                                              550.33
                                                                       0.05000
                                                                                   549.86
1871
       0.01000
                            1.12092
                                       1052.38
                                                  0.03198
                                                              550.33
                                                                       0.05000
1872
       0.01000
                  1053.97
                            1 12229
                                       1053 97
                                                  0 03225
                                                              550.33
                                                                       0.05000
                                                                                   550 04
                  1054.70
1873
       0.01000
                            1.11575
                                       1054.70
                                                  0.03274
                                                              550.33
                                                                       0.05000
                                                                                   550.08
1878
       0.01000
                  1049.73
                            1.11129
                                       1049.73
                                                  0.03189
                                                              550.33
                                                                       0.05000
                                                                                   549 86
1879
       0.01000
                  1052.38
                            1.12092
                                       1052.38
                                                  0.03198
                                                              550.33
                                                                       0.05000
                                                                                   549.97
1880
       0.01000
                  1053.83
                             1.12251
                                       1053.83
                                                  0.03221
                                                              550.33
                                                                       0.05000
                                                                                   550.03
1881
       0.01000
                  1054.68
                             1.11640
                                       1054.68
                                                  0.03270
                                                              550.33
                                                                       0.05000
                                                                                   550.08
1929
                  1071.28
       0.01000
                            1.15153
                                       1071.28
                                                  0.03419
                                                              550.33
                                                                       0.05000
                                                                                   550.17
1930
       0.01000
                  1073.61
                            1.15066
                                       1073.61
                                                  0.03450
                                                              550.33
                                                                       0.05000
                                                                                   550.15
                  1076.91
                            1.14640
                                       1076.91
                                                  0.03527
1931
       0.01000
                                                              550.33
                                                                       0.05000
                                                                                   550.18
                 OPTIMIZATION SYSTEM FOR TPSSYM = 15
```

```
TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 956
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
```

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



MAXIMUM TEMPERATURE OF EVERY LAYER 1 2 3 4 4 Tmax: 2300.33 2300.33 550.33 600.33 Optv: 2252.56 2252.56 481.33 481.33

VALUES OF DESIGN VARIABLES : LAYER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09 0.30053 0.19904 0.39873 0.36375 0.15588 0.26656 0.14822 0.34375 0.14274 2.62965 0.14222 1.09518 0.01772 2.43083 2.86073 1.09567 2.17544 1.03258 1.06641 1.00000 0.03969 0.15485 0.04890 0.04991 0.36959 0.07020 0.04679 0.05000 0.05000 0.06310 0.05000

THE ORIGINAL OBJECTIVE FUNCTION = 207.8086090

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.4997677

THE TOTAL OPTIMAL WEIGHT = 1.56195893E+05

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
      0.1638E+01
                                                         A A AA A
                                             A A
             A A A AA A AA
                                   A A AA
               A A AA AA A
  0.0
 -1.0 +
                                                                                                           .91
                                                  .41 .51 .61
TIME ( X 1.121E-43 )
                                                                                     .71
             OPTIMAL STRUCTURES OF TRS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
 -----
                     HRSI COAT
                                                           0.25769 in. 2252.6 F
                                        thin skin
                     LI-900 (P)
                                                            1.70962 in. 2252.6 F
-----
                                                            0.10443 in. 481.3 F
                    RTV-560
                                       thin skin
_____
                                                            ----
                                                            0 05737 in 481 3 F
                    17 LB SIP .16 IN
 _____
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
        LAYER01
                            LAYER02
                                               LAYER03
                                                                  LAYER04
          0.18922
                   1799.19
                            2.27791
                                      1799.19
                                               0.02971
                                                          524.63
                                                                  0.05999
                                                                            458.37
                                      1879.69
1968.65
     46
         0.27327
                   1879.69
                           2.35081
                                               0.09060
                                                          546.32
                                                                  0.05519
                                                                            352.22
          0.30786
                   1968.65
                                               0.13056
                                                          550.33
                                                                            283.36
     47
                            2.45540
                                                                  0.05180
          0.28624
                   2093.86
                            2.62519
                                      2093.86
                                               0.14974
                                                          550.33
                   2217.66
     49
          0.21129
                            2.80634
                                      2217.66
                                               0.14405
                                                          550.33
                                                                  0.04998
                                                                            270.80
          0.15588
                   1985.38
                            2.43083
                                      1985.38
                                               0.03969
                                                          550.33
     56
          0.25928
                   2038.47
                            2.52628
                                      2038.47
                                               0.10233
                                                          550.33
                                                                  0.05459
                                                                            342.29
                   2100.66
          0.30053
                            2.62965
                                      2100.66
                                               0.14222
                                                          550.33
                                                                  0.05000
     58
          0.27996
                   2172.61
                            2.74200
                                      2172.61
                                               0.15973
                                                          550.33
                                                                  0.04848
                                                                            229.31
                            2.86073
          0.19904
                                               0.15485
     59
                   2252.56
                                      2252.56
                                                          550.33
                                                                  0.05000
                                                                            254.33
          0.37930
                    624.85
                            1.26087
                                       624.85
                                               0.00603
                                                          377.34
                                                                  0.04982
                    737.78
981.73
     86
          0.37864
                            1.13175
                                       737.78
                                               0.03730
                                                          491.09
                                                                  0.05872
                                                                            365.78
          0.35911
                                       981.73
                                               0.05784
     88
          0 32298
                   1322.31
                            1 60863
                                      1322 31
                                               0.06475
                                                          550 33
                                                                  0.05958
                                                                            418 16
                   1807.92
          0.26847
                            2.24368
                                      1807.92
                                               0.06196
                                                          550.33
                                                                  0.05081
                                                                             393.92
                            1.47114
1.37247
                                               0.00129
0.04312
     95
          0.34715
                   853.22
                                       853.22
                                                          402.46
                                                                  0.05079
                                                                            332.13
                                                                  0.05780
     96
          0.36010
                    968.28
                                       968.28
                                                          506.97
                                                                            369.99
                            1.48652
     97
          0.34997
                   1187.35
                                      1187.35
                                               0.07099
                                                          550.33
                                                                  0.06046
                                                                             391.72
     98
          0.31867
                   1482.43
                            1.79726
                                      1482.43
                                               0.08146
                                                          550.33
                                                                  0.05836
                                                                            394.52
          0.26452
                   1896.70
                                      1896.70
                                               0.07793
    105
          0.30132
                   1145.17
                            1.72769
                                      1145.17
                                               0.00442
                                                          438.04
                                                                  0.05302
                                                                            373.51
    106
          0.33407
                   1254.87
                            1.67662
                                      1254.87
                                               0.05466
                                                          522.30
                                                                  0.05688
                                                                             369.38
    107
          0.33730
                   1438.22
                            1.78501
                                      1438.22
                                               0.08862
                                                          550.33
                                                                  0.05802
                                                                            363.93
    108
          0.31039
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                            2.05188
                                      1682.41
                                               0.10249
                                                          550.33
                                                                  0.05611
                                                                             356.62
    109
          0.25320
                   2010.37
                            2.50438
                                      2010.37
                                               0.09827
                                                          550.33
                                                                  0.05078
                                                                             343.98
    115
          0.24114
                   1502.96
                            2.03169
                                      1502.96
                                               0.01602
                                                          484.57
                                                                  0.05659
                                                                            420.90
          0.30046
                                      1600.45
                                               0.07290
                                                          536.94
    117
          0 32102
                   1735 91
                            2.15554
                                      1735 91
                                               0 11140
                                                          550.33
                                                                  0.05469
                                                                            322 04
          0.29770
                            2.37309
                                                          550.33
    118
                   1918.38
                                      1918.38
                                               0.12868
                                                                  0.05276
                                                                            301.47
    119
          0.23201
                   2137.35
                            2.68545
                                      2137.35
                                               0.12369
                                                          550.33
                                                                  0.05020
                                                                            303.08
          0.14822
                   914.09
                            1.03258
                                               0.36959
                                                                  0.09098
    125
                                       914.09
                                                          548.44
                                                                            182.79
    126
          0.29690
                    422.61
                            1.06234
                                       422.61
                                               0.18416
                                                          267.62
                                                                  0.06519
                    219.35
297.68
                            1.06641
1.04504
                                       219.35
297.68
    127
          0.34375
                                               0.07020
                                                          168.61
                                                                  0.05000
                                                                            117.88
          0.29050
                                               0.02454
                                                                             198.16
    128
                                                          247.92
                                                                  0.04498
    129
          0.14274
                    644.88
658.97
                            1.00000
                                       644.88
                                               0.04679
                                                          496.25
                                                                  0.05000
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                            0.90611
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                                               0.29385
                                                                             177.99
          0.22588
                                                          489.84
                                                                  0.08115
    135
    136
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                             0.87874
                                       321.00
                                               0.15653
                                                          313.65
                                                                  0.06572
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                            0.90019
                                       212.01
                                               0.06002
                                                                  0.05486
    137
                                                          251.88
                                                                            196.53
                                               0.02050
          0.19634
                    794.11 1.18083
                                       794.11
                                               0.03154
                                                          484.99
                                                                  0.04975
                                                                            366.26
```

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145
           0.29277
                      456.67
                               0.81963
                                           456.67
                                                     0.22349
                                                                 439.48
                                                                          0.07223
                                                                                      178.62
     146
           0.35259
                      237.76
                                0.74015
                                           237.76
                                                     0.12434
                                                                 349.13
                                                                          0.06494
                                                                                      211.76
     147
           0 36612
                      227.71
457.76
                                0 78202
                                           246.06
                                                     0.05002
                                                                 326.01
                                                                          0.05852
                                                                                      264.41
     148
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                                                     0.01897
                                                                 375.60
                                                                          0.05404
                                                                                      322.82
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                                           937.92
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                                                                          0.05054
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                                0.78071
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                                                                          0.06462
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                                                                                      320.27
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                                0.98123
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                                                     0.02029
                                                                 436.23
                                                                          0.05731
                                                                                      372.03
     159
           0 25274
                      1088.92
                                1.45937
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                                                     0.02324
                                                                 511.69
                                                                          0.05141
                                                                                      409.31
                                0.79261
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                                           254.82
                                                     0.10899
                                                                 372.54
                                                                          0.05855
                                                                                      198.27
     166
           0.39252
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                                0.65351
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                                                     0.06767
                                                                 403.13
                                                                          0.06217
                                                                                      287.37
     167
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                                0.73381
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                                                     0.03715
                                                                 444.92
                                                                          0.06268
                                                                                      363.50
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                                1.04903
                                            710.76
                                                     0.02461
                                                                 529.36
     169
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                                                     0.02627
                                                                          0.05183
                                                                                      421.58
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                                                                          0.05414
     176
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                                0.70451
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                                                     0.04933
                                                                 429.59
                                                                          0.06113
                                                                                      318.79
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                                0.80702
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                                                     0.03687
                                                                 489.99
     177
                                                                          0.06348
                                                                                      393.69
     178
           0.33237
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                                1.17311
                                           879.58
                                                     0.03205
                                                                 528.16
                                                                          0.06035
                                                                                      428.03
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                                          1425.97
                                                     0.03236
                                                                 542.33
                                                                          0.05159
                                                                                      424.16
           0.40719
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                                                                                      240.41
     186
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                                                     0.03942
                                                                 456.40
                                                                          0.06043
                                                                                      344.41
     187
           0.37031
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                                0.93357
                                           658.79
                                                     0.04110
                                                                 525.20
                                                                          0.06359
     188
           0 32772
                      1065.42
                                1.34202
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                                                     0.04236
                                                                 550.33
                                                                          0.06031
                                                                                      434.22
           0.26996
                     1596.49
                                1.99260
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                                                     0.04055
                                                                 548.92
                                                                          0.05087
                                                                                      417.66
     189
     195
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                                1.09518
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                                                                 361.95
                                                                          0.05000
                                                                                      267.06
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                                0.95515
                                           574.14
                                                     0.03703
                                                                 480.20
                                                                          0.05991
                                                                                      361.68
                                1.09576
                                            832.95
           0.36376
                                                     0.04890
                                                                 550.33
                                                                          0.06310
     198
           0.32247
                      1224.79
                                1.50574
                                           1224.79
                                                     0.05286
                                                                 550.33
                                                                          0.05971
                                                                                      429.49
                      1747.00
     199
           0.26656
                                2.17544
                                           1747.00
                                                     0.04991
                                                                 550.33
                                                                          0.05000
                                                                                      405.06
                     OPTIMIZATION SYSTEM FOR TPSSYM = 16
 TOTAL NUMBER OF DESIGN VARIABLES =
 TOTAL NUMBER OF CONSTRAINS
                                   = 956
 TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1954E+04
   1.0 B
                            В
                                      В
                                                 В
                                                                      В
                                                                                           R
                                                                                                                В
                                                                                                                          В
                 D
                            D
                                      D
                                                                      D
                                                                                           D
                                                                                                     D
                                                                                                                D
   0.0
  -1.0
       .08
                   .18
                                .28
                                             .38
                                                               .58 .68
TIME ( X 1.401E-44 )
                                                                                               .78
                                                                                                            .88
                                                                                                                        .98
                                                                                                                                  1.08
               MAXIMUM TEMPERATURE OF EVERY LAYER
       1 2 3 4
2300.33 2300.33 550.33 600.33
LAYER:
Tmax:
        1954.13 1954.13
                           549.08
                                    549.08
                    VALUES OF DESIGN VARIABLES :
LAYER
         DEV01
                  DEV02
                           DEV03
                                     DEV04
                                              DEV05
                                                        DEV06
                                                                 DEV07
                                                                           DEV08
                                                                                    DEV09
       0.01000
                0.01000
                          0.01000
                                   0.01000
                                             0.01000
                                                      0.01000
                                                               0.01000
                                                                         0.01000
                                                                                  0.01000
       2.07346
                2.21188
                          2.45880
                                   1.33464
                                             1.47211
                                                      1.65866
                                                               1.00000
                                                                         1.03654
                                                                                  1.00000
                                             0.02759
       0.01795
                0.02309
                          0.02259
                                   0.02617
                                                      0.02456
                                                               0.02791
                                                                         0.06275
                                                                                  0.05444
       0.05000
                0.05000
                          0.05000
                                   0.05000
                                             0.05000
                                                      0.05000
                                                                0.05000
                                                                         0.05000
                                                                                  0.05000
 THE ORIGINAL OBJECTIVE FUNCTION =
 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.5132689
THE TOTAL OPTIMAL WEIGHT = 8.02899942E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
       0.1002E+01
   Х
   1.0 +
```

```
A A
                  AAA AA AAA AA AAA AAA AAA AA AAA AA AAA AA AAA AA AAA AA AAA AA AAA AA AAA AAA AAA AAA AAA AAA AAA AAA AAA AAA
 -1.0 +
     0.1
               .11
                         .21
                                   .31
                                                                                          .71
                                                                                                      .81
                                                                                                                   .91
                                                                                                                            1.01
                                                                  .51
                                                           TIME ( X 1.261E-43 )
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                   (WITH AVERAGE THICKNESS)
                                                               0.01000 in. 1954.1 F
                     HRST COAT
                                          thin skin
______
                                                               ----
                     T-T-900 (P)
                                                               1.58290 in. 1954.1 F
                                          slab
_____
                     RTV-560
                                          thin skin
                                                               0.03190 in. 549.1 F
_____
                                                               0.05000 in. 549.1 F
                     17 LB SIP .16 IN
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                              16
 PANEL LAYER01
                             LAYER02
                                                  T VALDU3
                                                                      LAYER04
    41
42
         0.01000
                   1652.61
                             2.05246
                                       1652.61
                                                  0.02151
                                                             550.33
                                                                      0.05000
                                                                                 549.08
         0.01000
                                                  0.02284
                   1723.64
                            2.13130
                                       1723.64
                                                             550.33
                                                                                 549.08
     43
         0.01000
                   1807.19
1897.66
                             2.24238
                                       1807.19
1897.66
                                                  0.02309
                                                             550.33
                                                                      0.05000
                                                                                 549.08
         0.01000
                             2.37642
                                                             550.33
                                                                      0.05000
                                                                                 549.08
     44
     51
         0.01000
                   1698.07
                             2.13041
                                        1698.07
                                                  0.02134
                                                             550.33
                                                                      0.05000
                                                                                 548.52
         0.01000
                   1772.77
                                        1772.77
                                                  0.02309
                                                             550.33
                                                                      0.05000
     52
                             2.21188
                                                                                 547.89
     53
         0.01000
                   1858.27
                             2.32154
                                        1858.27
                                                  0.02350
                                                             550.33
                                                                      0.05000
                                                                                 547.14
     54
         0.01000
                   1954 13
                             2.45880
                                        1954 13
                                                  0.02259
                                                             550 33
                                                                      0.05000
                                                                                 546 28
         0.01000
                   1318.81
                             1.51230
                                        1318.81
                                                  0.02560
                                                             550.33
                                                                      0.05000
                                                                                 549.08
                   1373.16
1427.32
     82
         0.01000
                             1.58584
                                        1373.16
                                                  0.02550
                                                             550.33
                                                                      0.05000
                                                                                 549 08
     83
         0.01000
                              1.67422
                                        1427.32
                                                  0.02470
                                                             550.33
                                                                      0.05000
                                                                                 549.08
     84
         0.01000
                   1484.01
                              1 78149
                                        1484.01
                                                  0 02315
                                                             550.33
                                                                      0.05000
                                                                                 549 08
                    1399.70
                             1.63584
                                        1399.70
                                                  0.02410
                                                                      0.05000
                                                                                 549.08
     91
         0.01000
                                                             550.33
     92
         0.01000
                    1458.39
                              1.71189
                                        1458.39
                                                  0.02401
                                                             550.33
                                                                      0.05000
                                                                                 549.08
     93
         0.01000
                   1518.69
                             1.80606
                                        1518.69
                                                  0.02336
                                                             550.33
                                                                      0.05000
                                                                                 549.08
         0.01000
                    1582.49
                             1.92113
                                        1582.49
                                                  0.02215
                                                             550.33
                                                                      0.05000
                                                                                 549.08
                   1487.11
1550.30
    101
         0.01000
                             1.77546
                                        1487 11
                                                  0 02289
                                                             550 33
                                                                      0.05000
                                                                                 549 08
                             1.85319
                                        1550.30
                                                  0.02308
                                                             550.33
                                                                      0.05000
         0.01000
                                                                                 549.08
    102
    103
         0.01000
                    1617.95
                              1.95324
                                        1617.95
                                                  0.02267
                                                             550.33
                                                                      0.05000
                                                                                 549.08
                             2.07570
    104
         0.01000
                   1690.36
                                        1690.36
                                                  0.02168
                                                             550.33
                                                                      0.05000
                                                                                 549.08
          0.01000
                    1580.19
                              1.92958
                                        1580.19
                                                  0.02197
                                                             550.33
                                                                      0.05000
    112
         0.01000
                   1648.08
                              2.00854
                                        1648.08
                                                  0.02272
                                                             550.33
                                                                      0.05000
                                                                                 549.08
    113
         0.01000
                    1724.62
                              2.11513
                                        1724.62
                                                  0.02266
                                                             550.33
                                                                      0.05000
                                                                                 549.08
    114
         0.01000
                   1807.34
                             2.24495
                                        1807.34
                                                  0.02179
                                                             550.33
                                                                      0.05000
                                                                                 549.08
    121
                                                  0.05173
         0.01000
                    831.93
                              1.02873
                                         831.93
                                                             550.33
                                                                      0.05000
                                                                                 369.82
    122
         0.01000
                     852.67
                              1.03654
                                         852.67
                                                  0.06275
                                                             550.33
                                                                      0.05000
                                                                                 350.80
    123
         0.01000
                    874.63
                             1.02693
                                         874.63
                                                  0.06364
                                                             550.33
                                                                      0.05000
                                                                                 363.22
    124
         0.01000
                    897.77
                              1.00000
                                         897.77
                                                  0.05444
                                                             550.33
                                                                      0.05000
   131
         0.01000
                    866 12
                             1 02875
                                         866 12
                                                  0 04731
                                                             550 33
                                                                      0.05000
                                                                                 404 59
    132
         0.01000
                     891.66
                              1.04919
                                         891.66
                                                  0.05612
                                                             550.33
                                                                      0.05000
                    915.92
941.17
                             1.05672
1.05294
                                         915.92
941.17
                                                  0.05672
0.04907
                                                             550.33
550.33
                                                                      0.05000
0.05000
    133
         0.01000
                                                                                 398.47
    134
         0.01000
                                                                                 433.12
                     910.67
                                         910.67
    141
         0.01000
                              1.04503
                                                  0.04297
                                                             550.33
                                                                      0.05000
                                                                                 439.00
    142
         0.01000
                    940.78
                             1.07790
                                         940.78
                                                  0.04961
                                                             550.33
                                                                      0.05000
                                                                                 427.02
          0.01000
                              1.10224
                                         968.43
                                                  0.04978
                                                             550.33
                                                                      0.05000
    143
    144
         0.01000
                     996.01
                              1.12054
                                         996.01
                                                  0.04356
                                                             550.33
                                                                      0.05000
                                                                                 459.69
    151
         0.01000
                     965.17
                              1.08136
                                         965.17
                                                  0.03893
                                                             550.33
                                                                      0.05000
                                                                                 470.51
    152
         0.01000
                     999.83
                              1.12549
                                         999.83
                                                  0.04355
                                                             550.33
                                                                      0.05000
                                                                                 461.69
    153
         0.01000
                    1031.36
                              1.16535
                                        1031.36
                                                  0.04330
                                                             550.33
                                                                      0.05000
                                                                                 466.44
    154
         0.01000
                    1062.03
                              1.20413
                                        1062.03
                                                  0.03830
                                                             550.33
                                                                      0.05000
                                                                                 484.67
    161
         0.01000
                   1028.50
                             1.13878
                                        1028.50
                                                  0.03529
                                                             550.33
                                                                      0.05000
                                                                                 497.59
    162
                    1067.49
                              1.19237
                                        1067.49
                                                  0.03820
                                                             550.33
    163
         0.01000
                    1103.42
                              1 24624
                                        1103.42
                                                  0 03761
                                                             550 33
                                                                      0.05000
                                                                                 494 64
                    1137.90
                                        1137.90
                                                  0.03362
                                                             550.33
                                                                      0.05000
    164
         0.01000
                             1.30333
                                                                                 506.47
                             1.21513
1.27614
    171
         0.01000
                   1098.25
                                        1098.25
                                                  0.03214
                                                             550.33
                                                                      0.05000
                                                                                 519.32
    172
         0.01000
                    1141.26
                                        1141.26
                                                  0.03373
                                                             550.33
                                                                      0.05000
                                                                                 515.55
    173
         0.01000
                    1182.26
                              1.34265
                                        1182.26
                                                  0.03289
                                                             550.33
                                                                      0.05000
                                                                                 517.35
                             1.41559
1.30519
    174
         0.01000
                   1221.21
                                        1221.21
                                                  0.02972
                                                             550.33
                                                                      0.05000
                                                                                 524.06
                    1170.89
                                        1170.89
    181
          0.01000
                                                  0.02952
                                                             550.33
                                                                      0.05000
                                                                                 535.49
    182
         0.01000
                    1217.62
                              1.37168
                                        1217.62
                                                  0.03021
                                                             550.33
                                                                      0.05000
                                                                                 533.45
                                                                      0.05000
         0.01000
                    1264.54
                              1.44986
                                        1264.54
                                                  0.02922
                                                             550.33
    183
                                                                                 534.27
    184
          0.01000
                    1308.54
                              1.53615
                                        1308.54
                                                  0.02672
                                                             550.33
                                                                      0.05000
                                                                                 537.09
                                                  0.02749
                                                             550.33
                                                                      0.05000
    191
         0.01000
                   1240.60
                              1.39923
                                        1240.60
                                                                                 546.33
                                                                      0.05000
         0.01000
                   1344.48
                             1.55886
                                       1344.48
                                                  0.02661
                                                             550.33
                                                                      0.05000
                                                                                 545.62
```

```
194
          0.01000
                    1395.79
                             1.65866
                                        1395.79
                                                  0.02456
                                                             550.33
                                                                      0.05000
                                                                                 545.89
     309
          0.01000
                    1183.15
                              1.33464
                                        1183.15
                                                  0.02617
                                                             550.33
                                                                      0.05000
                                                                                 547.41
     310
          0.01000
                    1116.29
                              1.24131
                                        1116.29
                                                  0.02709
                                                             550 33
                                                                      0.05000
                                                                                 539 81
                                                             550.33
                                                                      0.05000
     311
          0.01000
                    1048.65
                              1.15513
                                        1048.65
                                                  0.02787
                                                                                 528.66
                                         984.29
     312
          0.01000
                     984.29
                              1.08354
                                                  0.02842
                                                             550.33
                                                                      0.05000
                                                                                 513.66
          0.01000
                     926.66
                                                  0.02868
     313
                              1.03181
                                         926.66
                                                             550.33
                                                                      0.05000
                                                                                 495.04
     314
          0.01000
                     878.07
                              1.00197
                                         878.07
                                                  0.02866
                                                             550.33
                                                                      0.05000
                                                                                 473.55
     315
          0.01000
                     839.46
                              0.99272
                                         839.46
                                                  0.02838
                                                             550.33
                                                                      0.05000
                                                                                 450.39
     316
          0.01000
                     810.57
                              1.00000
                                         810.57
                                                  0.02791
                                                             550.33
                                                                      0.05000
                                                                                 427.09
     317
          0.01000
                    1511.64
                              1.86526
                                        1511.64
                                                  0.02036
                                                             550.33
                                                                      0.05000
                                                                                 549.08
          0.01000
                                                  0.02210
                                                             550.33
                                                                      0.05000
     329
                    1422.77
                              1.71288
                                        1422.77
                                                                                 549.08
     341
          0.01000
                    1338.26
                              1.57325
                                        1338.26
                                                  0.02365
                                                             550.33
                                                                      0.05000
                                                                                 549.08
     353
          0.01000
                    1260.31
                              1.45005
                                        1260.31
                                                  0.02498
                                                             550.33
                                                                      0.05000
                                                                                 549.08
     389
          0.01000
                    1628.91
                              2.07346
                                        1628.91
                                                  0.01795
                                                                      0.05000
     401
          0.01000
                    1581.67
                              1.98870
                                        1581.67
                                                  0.01894
                                                             550.33
                                                                      0.05000
                                                                                 549.08
                   OPTIMIZATION SYSTEM FOR TPSSYM =
 TOTAL NUMBER OF DESIGN VARIABLES = 36
 TOTAL NUMBER OF CONSTRAINS
 TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
       0.1587E+04
                                    В
                                              В
                                                        В
                                                                  В
                                                                                                          В
                                                                                                                    В
                                                        D
                                                                  D
                                                                            D
                                                                                     D
                                                                                                                   D
  0.0
  -1.0
                                                      .48
                  .18
                            .28
                                    .38
                                                           .58 .68
TIME ( X 1.401E-44 )
                                                                                         .78
                                                                                                     .88
                                                                                                                 .98
                                                                                                                           1.08
              MAXIMUM TEMPERATURE OF EVERY LAYER
       1 2 3 4
2300.33 2300.33 550.33 600.33
1586.86 1586.86 550.23 550.23
LAYER:
Tmax:
Optv:
                   VALUES OF DESIGN VARIABLES :
              DEV02 DEV03 DEV04 DEV05
0.01000 0.01038 0.01000 0.01000
        DEV01
      0.01069
                                                  0.01000
                                                           0.01000 0.01000
                                                                             0.01000
      1.77636
               1.84544
                        1.98148
                                 1.00046
                                          1.18568
                                                   1.23522
                                                            1.00000
                                                                     1.00000
                                                                              1.00000
               0.02648 0.02124 0.04017
0.05000 0.05000 0.05000
      0.02600
                                          0.02877
                                                   0.03279
                                                            0.00100
                                                                     0.00100
                                                                              0.00100
      0.05000
                                         0.05000
                                                   0.05000
                                                           0.05000
                                                                    0.05000
                                                                              0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                      207.8066864
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0 4270920
THE TOTAL OPTIMAL WEIGHT = 8.43256413E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.
       0.6619E+00
             0.0
```

```
-1.0 +
              .11
                                    .31
                                                 .41 .51 .61
TIME ( X 1.261E-43 )
                                                                                           .71
                                                                                                       .81
                                                                                                                    .91
                                                                                                                             1 01
            OPTIMAL STRUCTURES OF TPS FOR PATCH = 17
(WITH AVERAGE THICKNESS)

HRSI COAT thin skin
                                                                0.01012 in. 1586.9 F
_____
                                                               -----
i
                     LI-900 (P)
                                                                1.33607 in. 1586.9 F
                                                                i
-----
-----
RTV-560 thin skin
                                                                0.01983 in. 550.2 F
                                                               ----
                                                                 i
                     17 LB SIP .16 IN
                                                                0.05000 in. 550.2 F
                                          slab
_____
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                              LAYER02
 PANEL
         LAYER01
                                                  LAYER03
                                                                      LAYER04
    269
          0.01000
                   1060.87
                              1.00046
                                        1060.87
                                                  0.04017
                                                             550.33
                                                                                  549.63
                                                             550.33
                   1002.66
                                        1002.66
    270
         0.00993
                             0.92176
                                                  0.03921
                                                                      0.05000
                                                                                  546.97
                                         945.62
                                                  0.03674
                                                                                  543.03
                   893.73
850.12
    272
         0.00985
                             0.82884
                                         893.73
                                                  0.03249
                                                             550.33
                                                                      0.05000
                                                                                  537.70
    273
                              0.82879
                                                  0.02643
                                                              550.33
                                                                       0.05000
         0.00985
                                         850.12
                                                                                  531.06
                                         816.49
793.10
    274
         0.00988
                    816.49
                             0.86135
                                                  0.01880
                                                              550.33
                                                                      0.05000
                                                                                  523.37
    275
         0.00993
                                                              550.33
                                                                      0.05000
                    793.10
                             0.92146
                                                  0.01010
                                                                                  515.06
                             1.00000
    276
          0.01000
                    778.87
                                         778.87
                                                  0.00100
                                                              550.33
                                                                       0.05000
    277
         0.01000
                    1083.38
                             1.10994
                                        1083.38
                                                  0.03255
                                                             550.33
                                                                      0.05000
                                                                                  549.73
                                        1024.92
                                                  0.03123
                    967.46
914.96
                                         967.46
914.96
    279
         0 00996
                             0.96878
                                                  0.02882
                                                              550.33
                                                                      0.05000
                                                                                  545 46
                              0.92609
                                                  0.02515
                                                              550.33
                                                                       0.05000
    280
         0.00995
                                                                                  542.00
    281
         0 00995
                     870.57
                             0.90933
                                         870.57
                                                  0.02026
                                                              550.33
                                                                      0.05000
                                                                                  537 68
    282
         0.00996
                    836.00
                             0.91903
                                         836.00
                                                  0.01433
                                                              550.33
                                                                      0.05000
                                                                                  532.70
    283
         0.00998
                     811.56
                             0.95156
                                         811.56
                                                  0.00774
                                                              550.33
                                                                      0.05000
                                                                                  527.36
    284
         0.01000
                     796.24
                             1.00000
                                         796.24
                                                  0.00100
                                                             550.33
                                                                      0.05000
                                                                                  522.04
                    1108.67
                                                              550.33
    285
         0.01000
                             1.18568
                                        1108.67
                                                  0.02877
                                                                       0.05000
                                                                                  549.88
    286
         0.01000
                    1049.15
                             1.10778
1.04002
                                        1049.15
                                                  0.02731
                                                             550.33
                                                                      0.05000
                                                                                  548.64
    287
                    990.19
                                         990.19
                                                  0.02496
                                                              550.33
                                                                       0.05000
         0.01000
                                                                                  546.80
    288
         0.01000
                     935.69
                              0.98957
                                         935.69
                                                  0.02161
                                                              550.33
                                                                      0.05000
                                                                                  544.30
         0.01000
                             0.96100
                                                  0.01731
                                                              550.33
                                                                      0.05000
                                                                                  541.17
    289
                     888.82
                                         888.82
    290
         0.01000
                     851.37
                              0.95536
                                         851.37
                                                  0.01223
                                                              550.33
                                                                       0.05000
                                                                                  537.54
    291
         0.01000
                     823 80
                              0 97015
                                         823 80
                                                  0.00666
                                                              550 33
                                                                      0.05000
                                                                                  533 64
    292
         0.01000
                     805.29
                              1.00000
                                         805.29
                                                  0.00100
                                                              550.33
                                                                      0.05000
                                                                                  529.72
    293
         0.01000
                    1136.67
                              1.22749
                                        1136.67
                                                  0.02884
                                                              550.33
                                                                      0.05000
                                                                                  550 05
                                                  0.02754
                                                                       0.05000
    294
         0.01000
                    1075.19
                              1.14597
                                        1075.19
                                                              550.33
                                                                                  548.82
    295
         0 00999
                    1013.53
                              1.07355
                                        1013.53
                                                  0 02531
                                                              550.33
                                                                      0.05000
                                                                                  546 99
    296
         0.00999
                     955.54
                              1.01740
                                                                      0.05000
                                         955.54
                                                  0.02202
                                                              550.33
                                                                                  544.49
    297
          0.00999
                     904.45
                              0.98226
                                         904.45
                                                  0.01772
                                                              550.33
                                                                       0.05000
                                                                                  541.36
    298
         0.00999
                     862.24
                             0.96949
                                         862.24
                                                  0.01256
                                                             550.33
                                                                      0.05000
                                                                                  537.71
    299
         0.00999
                     829.60
                             0.97704
                                         829.60
                                                  0.00685
                                                              550.33
                                                                      0.05000
                                                                                  533.76
    300
         0.01000
                     806.03
                             1.00000
                                         806.03
                                                  0 00100
                                                              550 33
                                                                      0.05000
                                                                                  529 75
                    1167.36
                                        1167.36
                                                  0.03279
                                                             550.33
                                                                      0.05000
         0.01000
                              1.23522
                                                                                  550.23
    301
    302
         0.00996
                    1102.96
                              1.14712
                                        1102.96
                                                  0.03193
                                                              550.33
                                                                       0.05000
                                                                                  548.53
    303
         0.00993
                    1037.38
                              1.06932
                                        1037.38
                                                  0.02985
                                                              550.33
                                                                      0.05000
                                                                                  545.99
    304
          0.00992
                     974.45
                              1.00962
                                         974.45
                                                  0.02637
                                                              550.33
                                                                       0.05000
    305
         0.00992
                     917.46
                              0.97321
                                         917.46
                                                  0.02147
                                                              550.33
                                                                      0.05000
                                                                                  538.23
                     868.63
                                         868.63
                                                              550.33
    306
          0.00993
                              0.96152
                                                  0.01532
                                                                      0.05000
                                                                                  533.19
                    828.99
                                         828.99
798.45
    307
         0.00996
                              0.97225
                                                  0.00833
                                                              550.33
                                                                      0.05000
                                                                                  527.71
                              1.00000
                     798.45
                                                                       0.05000
    308
         0.01000
                                                  0.00100
                                                              550.33
                                                                                  522.14
    318
         0.01026
                    1474.27
                              1.76078
                                        1474.27
                                                  0.02640
                                                              550.33
                                                                       0.05000
                                                                                  550.23
    319
         0.01004
                    1434.06
                              1.70128
                                        1434.06
                                                  0.02733
                                                             550.33
                                                                      0.05000
                                                                                  550.23
    320
          0.01000
                    1398.97
                                        1398.97
                                                  0.02863
                                                              550.33
                                                                       0.05000
    321
         0 01015
                    1369 11
                              1 58034
                                        1369 11
                                                  0 03041
                                                              550 33
                                                                      0.05000
                                                                                  550 23
    322
         0.01046
                    1344.69
                             1.51827
                                        1344.69
                                                  0.03269
                                                              550.33
                                                                      0.05000
                                                                                  550.23
                    1391.48
1353.21
                             1.60672
1.56315
                                        1391.48
1353.21
                                                  0.02935
0.02866
                                                             550.33
550.33
                                                                      0.05000
0.05000
    330
         0.01018
                                                                                  550.23
    331
         0.01003
                                                                                  550.23
    332
         0.01000
                    1319.66
                              1.50768
                                        1319.66
                                                  0.02955
                                                              550.33
                                                                      0.05000
                                                                                  550.23
                    1290.91
1267.28
                             1.44011
1.36167
    333
         0.01010
                                        1290.91
                                                  0.03206
                                                              550.33
                                                                      0.05000
                                                                                  550.23
    334
                                        1267.28
                                                  0.03612
                                                              550.33
          0.01032
                    1313.21
1277.24
                             1.46840
1.43884
    342
         0.01011
                                        1313.21
                                                  0.03140
                                                              550.33
                                                                      0.05000
                                                                                  550.23
    343
         0.01002
                                                  0.02937
                                                              550.33
                                                                      0.05000
                                                                                  550.23
    344
         0.01000
                    1245.47
                              1.38795
                                        1245.47
                                                  0.02990
                                                              550.33
                                                                      0.05000
                                                                                  550.23
    345
         0.01006
                    1217.95
                              1.31584
                                        1217.95
                                                  0.03300
                                                              550.33
                                                                      0.05000
                                                                                  550.23
    346
         0.01020
                    1194.98
                              1.22421
                                        1194.98
                                                  0.03853
                                                              550.33
                                                                      0.05000
                                                                                  550.23
    354
         0.01005
                    1240.41
                             1.34744
                                        1240.41
                                                  0.03255
                                                             550.33
                                                                      0.05000
                                                                                  550.23
    355
                              1.32981
                                        1207.07
                                                  0.02946
                                                              550.33
    356
         0.01000
                    1177.25
                              1 28354
                                        1177 25
                                                  0.02968
                                                              550 33
                                                                      0.05000
                                                                                  550 23
    357
                    1151.00
                                        1151.00
                                                  0.03319
                                                              550.33
                                                                      0.05000
         0.01003
                              1.20891
                                                                                  550.23
    358
         0.01010
                    1128.57
                              1.10738
                                        1128.57
                                                  0.03989
                                                              550.33
                                                                      0.05000
                                                                                  550 23
         0.01038
                    1586.86
                              1.98148
                                        1586.86
                                                  0.02124
                                                              550.33
                                                                       0.05000
    390
                                                                                  549.98
    391
         0.01006
                    1548.36
                              1.90509
                                        1548.36
                                                  0.02458
                                                              550.33
                                                                       0.05000
                                                                                  549.85
                    1515.19
1487.35
    392
         0.01000
                              1.84544
                                        1515.19
                                                  0.02648
                                                             550.33
                                                                      0.05000
                                                                                  549.80
                              1.80253
                                        1487.35
    393
          0.01021
                                                  0.02695
                                                              550.33
                                                                       0.05000
                                                                                  549.85
    394
         0.01069
                    1464.83
                              1.77636
                                        1464.83
                                                  0.02600
                                                              550.33
                                                                       0.05000
                                                                                  549.98
                              1.88950
                                                                       0.05000
    402
         0.01033
                    1540.69
                                        1540.69
                                                  0.02351
                                                              550.33
                                                                                  550.23
    403
          0.01005
                    1500.66
                              1.81892
                                        1500.66
                                                  0.02584
                                                              550.33
                                                                       0.05000
                                                                                  550.23
                              1.75775
                                                  0.02750
                                                             550.33
                                                                       0.05000
                                                                                  550.23
    404
         0.01000
                    1465.85
                                        1465.85
                                                                       0.05000
    406
         0.01059
                    1412.37
                              1.66167
                                        1412.37
                                                  0.02910
                                                             550.33
                                                                       0.05000
                                                                                  550.23
```

```
TOTAL NUMBER OF DESIGN VARIABLES =
TOTAL NUMBER OF CONSTRAINS = 956
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS = 13
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  Х 0
1.0 В
        0.1433E+04
                            В
                                                                                                                              В
                                       D
                                                  D
                                                             D
                                                                                                                              Α
                                                                                                                   D
                                                                                                                              D
   0.0
  -1.0 +
       .08
                   .18
                                                                 .58 .68
TIME ( X 1.401E-44 )
                              .28
                                            .38
                                                                                                  .78
                                                                                                               .88
                                                                                                                            .98
                                                                                                                                      1 0.8
               MAXIMUM TEMPERATURE OF EVERY LAYER
      1 2 3 4
2300.33 2300.33 550.33 600.33
1433.32 1433.32 550.32 550.32
LAYER:
Tmax:

        VALUES OF DESIGN VARIABLES:

        DEV01
        DEV02
        DEV03
        DEV04
        DEV05
        DEV06

        0.01000
        0.01000
        0.01000
        0.01000
        0.01000
        0.01000

LAYER
                                                                   DEV07
                                                                             DEV08
                                                                 0.01000 0.01000
                                                                                     0.01000
    2 1.69554 1.63332 1.74265 1.00012 1.00025
3 0.01741 0.03083 0.02665 0.02601 0.03082
                                                       1 00031
                                                                 1.00000
                                                                           1.00000
                                                                                     1 00000
                                                       0.03539
                                                                 0.00100
                                                                           0.00100
    4 \quad 0.05000 \quad 0.05000 \quad 0.05000 \quad 0.05000 \quad 0.05000 \quad 0.05000 \quad 0.05000 \quad 0.05000 \quad 0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                         207.8066864
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.3924053
THE TOTAL OPTIMAL WEIGHT = 8.28762920E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.5887E+00
1.0 + A A A
| A A
                        .02
                   .12
                                .22
                                              .32
                                                                 .52 .62
TIME ( X 9.809E-44 )
                                                                                                 .72
                                                                                                             .82
                                                                                                                          .92
                                                                                                                                     1.02
               OPTIMAL STRUCTURES OF TPS FOR PATCH =
                       (WITH AVERAGE THICKNESS)
 _____
                        HRSI COAT
                                               thin skin
                                                                     0.01000 in. 1433.3 F
 -----
                        LI-900 (P)
                                                                     1.23024 in. 1433.3 F
                                                                      i
                                                                     0.01890 in. 550.3 F
                        RTV-560
                                              thin skin
```

_____ 17 LB SIP .16 IN slab 0.05000 in. 550.3 F _____ THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH = 18 LAYER02 LAYER04 PANEL LAYER01 LAYER03 975.95 975.95 550.33 550.02 0.01000 1.00012 0.05000 229 0.02601 921.32 867.41 921.32 867.41 817.88 550.33 550.33 230 0.01000 0.92733 0.02540 0.05000 544.16 231 0.01000 0.87166 0.02382 0.05000 535.39 0.02110 550.33 523.48 0.01000 775.65 233 0.01000 775.65 0.84148 0.01724 550.33 0.05000 508.58 234 742.34 0.87162 742.34 550.33 0.01000 0.01237 0.05000 491.26 235 0.01000 718.30 0.92728 718.30 0.00681 550.33 0.05000 472.52 702.73 0.00100 550.33 236 0.01000 702.73 1.00000 0.05000 453.62 237 0.01000 990.25 1.00009 990.25 0.02846 550.33 0.05000 549.98 238 0.01000 934.57 0.93322 934.57 0.02700 550.33 0.05000 544.73 879.87 879.87 0.01000 0.02468 240 0.01000 829.92 787.71 0.85423 829.92 787.71 0.02138 550.33 0.05000 526.18 241 0.01000 0.85423 0.01714 550.33 0.05000 242 0.01000 754.85 0.88198 754.85 0.01212 550.33 0.05000 497 32 243 0.01000 731.66 0.93319 731.66 0.00661 550.33 0.05000 480.58 463.77 244 0.01000 717.22 1.00000 717.22 0.00100 550.33 0.05000 245 0.01000 1004.86 1.00025 1004.86 0.03082 550.33 0.05000 550.01 948.50 550.33 0.01000 0.93483 948.50 0.02899 247 0.01000 893.37 0.88478 893.37 0.02627 550.33 0.05000 538.63 248 0.85764 0.01000 843.33 843.32 0.02258 550.33 0.05000 529.35 249 0.01000 801.38 0.85762 801.38 0.01798 550.33 0.05000 517.74 250 0.01000 0.88469 769.16 550.33 0.05000 769.16 0.01263 504.29 746.90 0.01000 746.90 0.93468 0.00684 550.33 0.05000 251 489.76 252 0.01000 733.58 1.00000 733.58 0.00100 550.33 0.05000 475.18 0.01000 1019.81 1.00040 1019.81 0.03313 550.33 0.05000 254 0.01000 963.09 0.93204 963.09 0 03137 550.33 0.05000 546 35 907.81 0.87976 907.81 255 0.01000 0.02861 550.33 0.05000 540.68 256 0.01000 857.91 0.85140 857.91 0.02472 550.33 0.05000 532 95 257 0.01000 816.45 0.85136 816.45 0.01976 550.33 0.05000 523.28 258 0.01000 785.06 0.87960 785.06 0.01391 550.33 0.05000 512.07 259 0.01000 763.89 0.93178 763.89 0.00751 550.33 0.05000 499.97 751.80 550.33 260 0.01000 1.00000 751.80 0.00100 0.05000 487.84 261 0.01000 1035.09 1.00031 1035.09 0.03539 550.33 0.05000 550.32 978.26 0.92463 978.26 0.03416 550.33 0.05000 547.41 262 0.01000 263 0.01000 923.11 0.86681 923.11 0.03169 550.33 0.05000 543.01 873.65 0.83548 0.02779 550.33 0.05000 264 0.01000 873.65 536.99 265 0.01000 832.94 0.83545 832.94 0.02248 550.33 0.05000 529.44 266 0.01000 802 57 0.86670 802 57 0 01595 550 33 0.05000 520 68 782.64 267 0.01000 0.92444 782.64 0.00861 550.33 0.05000 511.23 268 0.01000 771.89 1.00000 771.89 0.00100 550.33 0.05000 501 76 1311.90 323 0.01000 1311.90 1.49095 0.03141 550.33 0.05000 550.32 324 0 01000 1291.17 1.43804 1291 17 0.03333 550.33 0.05000 550 32 325 1269.62 0.05000 0.01000 1.41378 1269.62 0.03231 550.33 550.32 0.01000 1247.44 1.41797 1247.44 0.02838 550.33 0.05000 326 550.32 327 0.01000 1224.82 1.44907 1224.82 0.02173 550.33 0.05000 550.32 335 0.01000 1236.07 1.34298 1236.07 0.03361 550.33 0.05000 550.32 1217.25 336 0.01000 1 30651 1217.25 0 03418 550 33 0.05000 550 32 1197.88 550.33 0.05000 337 0.01000 1.28990 0.03269 550.32 338 0.01000 1178.10 1.29313 1178.10 0.02915 550.33 0.05000 550.32 339 0.01000 1158.12 1.31525 1158.12 0.02369 550.33 0.05000 550.32 0.01000 1165.58 1.21322 1165.58 0.03502 550.33 0.05000 348 0.01000 1148.42 1.19104 1148.42 0.03446 550.33 0.05000 550.32 1130.99 349 0.01000 1.18104 1130.99 0.03261 550.33 0.05000 550.32 350 0.01000 1113.36 1.18338 1113.36 0.02945 550.33 0.05000 550.32 0.02507 0.01000 1095.72 1.19769 1095.72 550.33 0.05000 550.32 351 0.01000 1101.06 1.10267 1101.06 0.03563 550.33 0.05000 550.32 359 360 0.01000 1085.22 1.09251 1085.22 0.03416 550.33 0.05000 550.32 0.01000 1069.37 1.08801 1069.37 0.03205 550.33 0.05000 361 362 0.01000 1053 58 1 08947 1053 58 0.02928 550 33 0.05000 550 32 363 0.01000 1037.91 1.09695 1037.91 0.02585 550.33 0.05000 550.32 1433.32 1412.09 1.74265 1.66654 1433.32 1412.09 0.02665 0.03094 550.33 550.33 395 0.01000 0.05000 549.69 0.05000 396 0.01000 549.87 1389.44 1389.44 397 0.01000 1.63332 0.03083 550.33 0.05000 550.02 398 0.01000 1365.36 1.64299 1365.36 0.02632 550.33 0.05000 550.15 0.01741 399 1339.86 1.69554 1339.86 550.33 0.01000 0.05000 550.26 1379.48 1357.85 407 0.01000 1379.48 1.62896 0.02894 550.33 0.05000 550.32 408 0.01000 1357.85 1.56220 0.03215 550.33 0.05000 550.32 409 0.01000 1335.02 1.53193 1335.02 0.03161 550.33 0.05000 550.32 410 0.01000 1311.22 1.53805 1311.22 0.02736 550.33 0.05000 550.32 0.01000 1286.51 1.57905 1286.51 0.01955 550.33 0.05000 550.32 OPTIMIZATION SYSTEM FOR TRSSYM = 19

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 956
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES

X 0.1202E+04

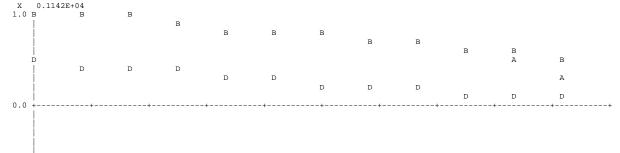
```
1.0 B
             В
                     В
                            В
                                                      В
                                                                                       R
                     D
                              D
                                      D
                                              D
                                                                                               В
                                                                                               D
  0.0
 -1.0
                                .38 .48 .58 .68
TIME ( X 1.401E-44 )
                                                                         .78
                       .28
     .08
              .18
                                                                .68
                                                                                   .88
                                                                                            .98
                                                                                                      1.08
            MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4
Tmax: 2300.33 2300.33 550.33 600.33
Optv: 1202.26 1202.26 545.42 545.42
  VALUES OF DESIGN VARIABLES:
YER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09
1 0.25947 0.38994 0.29487 0.40907 0.73258 0.52090 0.07117 0.12320 0.02213
LAYER
   2 1.00000 1.00000 1.05136 1.00000 1.00000 1.00000 1.00000
                                                                1.00000
     0.05629 \quad 0.06315 \quad 0.08323 \quad 0.00170 \quad 0.09930 \quad 0.02410 \quad 0.06222 \quad 0.04534
   4 0.12960 0.29291 0.11710 0.15414 0.19743 0.22999 0.05037 0.05243 0.05294
THE ORIGINAL OBJECTIVE FUNCTION =
                               207.8067017
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 1.7568405
THE TOTAL OPTIMAL WEIGHT = 4.06264817E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X
     0.1274E+02
                                                       AAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  A A AA AA AA AA A
 -1.0 +
            .11 .21 .31 .41 .51 .61 TIME ( X 2.242E-43 )
                                                                 .61 .71 .81 .91 1.01
            OPTIMAL STRUCTURES OF TPS FOR PATCH = (WITH AVERAGE THICKNESS)
 -----
                                                    0.31370 in. 1202.3 F
                  HRST COAT
                             thin skin
 -----
                  LI-900 (P)
                                   slab
                                                    1.00571 in. 1202.3 F
                  RTV-560
                                                    0.04849 in. 545.4 F
 ______
                                                    ----
                                                    0.14188 in. 545.4 F
                  17 LB SIP .16 IN
                                   slab
 ______
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                   19
  PANEL
        LAYER01
                         LAYER02
                                         LAYER03
                                                          LAYER04
                  786.52
                         1.00000
                                  786.52
                                                   550.33
                                                          0.22999
                                                                   375.64
    221
         0.52090
                                         0.02410
                 736.21
693.10
                         0.99460
                                  736.21
693.10
                                                  550.07
549.87
                                                         0.23111
                                                                  361.32
353.21
    222
         0.51509
                                         0.01668
    223
         0.48847
                                        0.00997
                                                  549.76 0.20708
549.77 0.17972
                         0.98825
                                  661.99
                                         0.00460
                                                                 363.48
                 645.89 0.98825
                                  645.89 0.00101
    225
        0.35968
```

```
226
      0.25985
                  645.41
                            0.99048
                                        645.41
                                                   0.00100
                                                               549.90
                                                                         0.14303
                                                                                     382.51
227
      0.14416
                  658.80
                            0.99460
                                         658.80
                                                   0.00100
                                                               550.10
                                                                         0.09955
                                                                                     408.82
228
      0.02213
                  682.32
                            1 00000
                                         682 32
                                                   0 00110
                                                               550 33
                                                                         0.05294
                                                                                     439 39
328
      0.40306
                 1057.93
                             1.03269
                                        1057.93
                                                   0.06352
                                                               549.85
                                                                         0.16777
                                                                                     479.67
      0 45225
                                                                         0.19092
340
                  979.73
                             1.02298
                                        979.73
                                                   0.05268
                                                               549.67
                                                                                     446.51
      0.48804
                  909.87
                             1.01448
                                        909.87
                                                   0.04266
                                                               549.73
                                                                         0.20880
                                                                                     418.65
352
364
                  848.45
                             1.00715
                                         848.45
                                                   0.03356
                                                               549.97
                                                                         0.22154
      0.51066
                                                                                     396.00
400
      0.29487
                 1202.26
                             1.05136
                                        1202.26
                                                   0.08323
                                                               550.33
                                                                         0.11710
                                                                                     544.47
412
      0.34872
                 1133.52
                             1.04229
                                        1133.52
                                                   0.07381
                                                               550.16
                                                                         0.14261
461
      0.40907
                  722.96
                             1.00000
                                        722.96
                                                   0.00170
                                                               550.33
                                                                         0.15414
                                                                                     445.28
                                                   0.00100
462
      0.40308
                  682.08
                             1.00000
                                         682.08
                                                               543.64
                                                                         0.15017
                                                                                     424.22
463
      0.38344
                  646.18
                             1.00000
                                         646.18
                                                   0.00144
                                                               533.70
                                                                         0.14251
                                                                                     400.11
464
      0.34779
                  619.10
                             1.00000
                                        619.10
                                                   0.00669
                                                               520.32
                                                                         0.13068
                                                                                     373.77
465
      0.29566
                   603.02
                             1.00000
                                         603.02
                                                   0.01603
                                                               503.62
                                                                                     346.04
466
      0.22906
                  598.58
                             1.00000
                                         598.58
                                                   0.02909
                                                               484.26
                                                                         0.09510
                                                                                     317.97
                                                                                     290.68
467
      0.15214
                   604.69
                             1.00000
                                         604.69
                                                   0.04497
                                                               463.27
468
      0.07117
                  618.75
                             1.00000
                                         618.75
                                                   0.06222
                                                               442.10
                                                                         0.05037
                                                                                     265.45
      0.63817
                  669.47
                                                   0.07235
                                                                         0.17652
469
                             1.00007
                                         669.47
                                                               467.32
                                                                                     282.61
470
      0.63502
                  621.53
                             1.00073
                                         621.53
                                                   0.07288
                                                               455.89
                                                                         0.16104
                                                                                     258.39
471
      0.60938
                  580.58
                             1.00122
                                         580.58
                                                   0.07260
                                                               444.96
                                                                         0.14365
                                                                                     238.88
                                                   0.07133
      0.55682
                             1.00149
473
      0.47628
                  568.28
                            1.00148
                                         536.40
                                                   0.06899
                                                               427.78
                                                                         0.10571
                                                                                     223.29
474
      0.37088
                  568.28
                             1.00119
                                         536.44
                                                   0.06568
                                                               422.40
                                                                         0.08656
475
      0 24748
                  568 28
                             1 00067
                                        549.79
                                                   0 06164
                                                               419.23
                                                                         0.06826
                                                                                     241 90
476
                  572.87
                             1.00000
                                         572.87
                                                   0.05722
                                                               417.95
                                                                         0.05160
                                                                                     260.40
      0.11640
477
      0.73258
                  662.95
                             1.00000
                                         662.95
                                                   0.09930
                                                               440.21
                                                                         0.19743
478
      0.73074
                  610.93
                             1.00000
                                         610.93
                                                   0.09974
                                                               428.13
                                                                         0.17876
                                                                                     217.47
                                                   0.09767
                             1.00000
                                         566.95
                                                               418.35
                                                                         0.15804
480
      0.64159
                  568.28
                            1.00000
                                         536.13
                                                   0.09255
                                                               412.15
                                                                         0.13607
                                                                                     217.47
                                                                                     217.47
481
      0.54748
                  568.28
                             1.00000
                                         521.51
                                                   0.08422
                                                               410.27
                                                                         0.11367
482
      0.42354
                  568.28
                             1.00000
                                         523.64
                                                   0.07299
                                                               412.78
                                                                         0.09172
                                                                                     217.47
                                                   0.05965
      0.27802
                             1.00000
                                                               419.08
                                                                         0.07104
483
                  568.28
                                         540.60
                                                                                     245.30
484
      0.12320
                             1.00000
                                         568.28
                                                   0.04534
                                                               428.03
                                                                         0.05243
                   568.28
485
      0.69288
                  702.47
                            0.99996
                                         702.47
                                                   0.08299
                                                               468.25
                                                                         0.21554
                                                                                     249.03
486
                   650.08
                             0.99796
                                         650.08
                                                   0.08088
                                                               459.88
487
      0 66209
                  605 02
                            0 99642
                                         605.02
                                                   0 07675
                                                               453 54
                                                                         0 18516
                                                                                     217.47
                                         573.31
                                                   0.07031
                                                                                     217.47
488
      0.60195
                  573.31
                            0.99558
                                                               450.40
                                                                         0.16365
489
      0 50890
                  568.28
                            0 99559
                                        558 13
                                                   0.06157
                                                               451 01
                                                                         0 13848
                                                                                     231 90
490
      0.38656
                  568.28
                            0.99642
                                         560.07
                                                   0.05087
                                                               455.36
                                                                         0.11060
                                                                                     260.97
491
      0.24322
                  577.12
                            0.99798
                                         577.12
                                                   0.03888
                                                               462.85
                                                                         0.08145
                                                                                     301.14
492
      0.09160
                  604.96
                            1.00000
                                         604.96
                                                   0.02657
                                                               472.36
                                                                         0.05288
                                                                                     347.69
493
      0.33542
                  944.08
                             1.00000
                                         944.08
                                                   0.03213
                                                               550.33
                                                                         0.14479
                                                                                     517.57
494
      0.36681
                  881.01
                            1.00000
                                         881.01
                                                   0.02136
                                                               550.33
                                                                         0.15047
                                                                                     501.01
495
                             1.00000
                                                               550.33
                                                                         0.15398
      0.38953
                                                   0.01279
                                                                                     483.98
                  824.32
                                         824.32
496
      0.40360
                   773.97
                             1.00000
                                         773.97
                                                   0.00640
                                                               550.33
                                                                         0.15532
                                                                                     466.46
                  935.14
                            0.99599
                                                   0.06406
497
      0.48731
                                         935.14
                                                               522.21
                                                                         0.23138
                                                                                     425.88
498
      0.54648
                  858.70
                            0.99721
                                         858.70
                                                   0.06689
                                                               507.29
                                                                         0.21850
                                                                                     383.94
499
      0 59121
                  790 34
                            0 99827
                                         790 34
                                                   0.06921
                                                               493 46
                                                                         0 20548
                                                                                     346 75
500
      0.62139
                   730.06
                            0.99919
                                         730.06
                                                   0.07099
                                                               480.77
                                                                         0.19228
                                                                                     314.40
501
      0 54808
                  951 85
                            0 99993
                                         951.85
                                                   0.07924
                                                               510.53
                                                                         0 26549
                                                                                     390 12
                            0.99996
                                        868.52
                                                   0.08667
                                                               489.96
                                                                         0.24917
                                                                                     336.91
502
      0.61949
                  868.52
503
      0.67379
                  794 10
                            0 99998
                                         794 10
                                                   0 09245
                                                               471 73
                                                                         0 23287
                                                                                     291 14
      0.71090
                   728.66
                             1.00000
                                                   0.09658
                                                               455.87
                                                                         0.21660
504
                                         728.66
                                                                                     252.90
505
      0.51878
                  993.59
                             1.01215
                                         993.59
                                                   0.07870
                                                               520.25
                                                                         0.24462
                                                                                     409.00
506
      0.58702
                  909.59
                            1.00854
                                        909.59
                                                   0.08161
                                                               504.54
                                                                         0.24028
                                                                                     358.61
507
      0.63849
                  834.62
                             1.00538
                                         834.62
                                                   0.08332
                                                               490.90
                                                                         0.23426
                                                                                     315.86
508
      0 67320
                  768 77
                            1 00264
                                         768 77
                                                   0.08384
                                                               479 34
                                                                         0 22665
                                                                                     280 78
                 1075.84
                                        1075.84
                                                   0.07515
                                                                         0.24683
                             1.01580
                                                               535.90
509
      0.44407
                                                                                     460.17
510
      0.37037
                 1151.24
                             1.01934
                                        1151.24
                                                   0.07156
                                                               550.33
                                                                         0.24702
                                                                                     508.23
                                                   0.07114
513
      0.46899
                 1034.78
                            0.99992
                                       1034.78
                                                               531.12
                                                                         0.28026
                                                                                     444.54
514
      0.38994
                 1112.03
                             1.00000
                                        1112.03
                                                   0.06315
                                                               550.33
                                                                         0.29291
517
      0.42073
                 1012.10
                             0.99474
                                       1012.10
                                                   0.06105
                                                               536.80
                                                                         0.24315
                                                                                     468.31
518
      0.35299
                 1084.94
                             0.99355
                                        1084.94
                                                   0.05805
                                                               550.33
                                                                         0.25380
                                                                                     508.56
521
      0 29871
                 1007 98
                             1.00000
                                       1007.98
                                                   0.04402
                                                               550.33
                                                                         0 13762
                                                                                     532 43
      0.25947
                            1.00000
                                                   0.05629
522
                 1069.97
                                       1069.97
                                                               550.33
                                                                         0.12960
                                                                                     545.42
```

OPTIMIZATION SYSTEM FOR TPSSYM = 20

TOTAL NUMBER OF DESIGN VARIABLES = 36
TOTAL NUMBER OF CONSTRAINS = 844
TOTAL NUMBER OF TEMP. PRINTOUTS = 13

MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES



```
-1.0
      .08
                                   .38
                                                     .48 .58 .68
TIME ( X 1.401E-44 )
                                                                                        .78
                                                                                                   .88
                                                                                                                .98
                                                                                                                          1.08
                 .18
              MAXIMUM TEMPERATURE OF EVERY LAYER
       1 2 3 4
2300.33 2300.33 550.33 600.33
1141.82 1141.82 543.24 543.24
LAYER:
Optv:
                   VALUES OF DESIGN VARIABLES :
   VALUES OF DESIGN VARIABLE.

ER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09

1 0.07036 0.01000 0.01000 0.07600 0.12296 0.10857 0.01001 0.13614 0.06223
   2 1.11326 1.20167 1.20030 1.02858 1.05268
                                                 1.05540 1.00000 1.01651
                                                                             1.00000
      0.03467
               0.10140
                        0.03991
                                 0.01431
                                          0.01977
                                                  0.02396
                                                           0.02535
                                                                    0.02199
   4 0.05000 0.05000 0.05000 0.05000 0.08853 0.05000 0.05000 0.07467
                                                                             0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                    166.2477417
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.6226656
 THE TOTAL OPTIMAL WEIGHT = 1.24153078E+05
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.9669E+00
  1.0 +
                                       Α
         A A A A A A A A A A
  -1.0
              .12 .22 .32 .42 .52 .62
TIME ( X 8.408E-44 )
      .02
                                                                                        .72
                                                                                                   .82
                                                                                                              .92
                                                                                                                         1.02
              OPTIMAL STRUCTURES OF TPS FOR PATCH = (WITH AVERAGE THICKNESS)
 HRSI COAT
                                                              0.06736 in. 1141.8 F
 -----
                                                              ----
                      T-T-900 (P)
                                          slab
                                                              1.07427 in. 1141.8 F
                                                              i
-----
                     RTV-560
                                                              0.03424 in. 543.2 F
                                         thin skin
                                                              0.05702 in. 543.2 F
                      17 LB SIP .16 IN
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                                               477.64
                     826.62
790.81
                             1.02858
1.01907
                                        826.62
790.81
                                                 0.01431
0.01316
                                                            550.33
546.11
                                                                     0.05000
    557
          0.07600
     558
          0.07233
                                                                                462.60
     559
          0.06659
                     754.82
                             1.01053
                                         754.82
                                                 0.01277
                                                            539.92
                                                                     0.05000
                                                                                444.72
                                         721.01
    560
          0.05860
                     721.01
                              1.00379
                                                 0.01338
                                                            531.63
                                                                     0.05000
                                                                                424.42
     561
          0.04841
                     691.14
                             0.99938
                                         691.14
                                                 0.01508
                                                             521.35
                                                                     0.05000
                                                                                402.29
    562
          0.03642
                     666.35
647.07
                             0.99746
                                         666.35
                                                 0.01782
                                                            509.46
                                                                     0.05000
                                                                                379.18
     563
          0.02331
                                         647.07
                                                 0.02136
                                                            496.63
     564
          0.01001
                     633.12
800.99
                             1.00000
                                         633.12
                                                 0.02535
                                                            483.72
                                                                     0.05000
                                                                                334 32
                                                            550.18
     565
          0.11268
                             1.04354
                                         800.99
                                                 0.01610
                                                                     0.08875
                                                                                444.12
                                         757.68
713.54
                                                 0.00861
0.00312
    566
          0.12076
                     757.68
                             1.02979
                                                            542.97
                                                                     0.09149
                                                                                443.33
          0.12722
                     713.54
                             1.01807
                                                            532.37
                                                                     0.09295
                                                                                437.12
     567
     568
          0.13115
                     671.32
                              1.00974
                                         671.32
                                                 0.00100
                                                            518.16
                                                                     0.09270
                                                                                424.42
                             1.00557
1.00572
     569
          0.13208
                     633.09
                                         633.09
                                                 0.00140
                                                            500.49
                                                                     0.09052
                                                                                404.99
     570
          0.12998
                     600.31
                                         600.31
                                                 0.00560
                                                             480.07
                                                                     0.08651
     571
          0.12526
                     573.69
                              1.00971
                                         573.69
                                                 0.01264
                                                            457.98
                                                                     0.08103
                                                                                349.82
                                                             435.76
                                         553.28
                                                 0.02152
                                                                     0.07467
     572
          0.11873
                     553.28
                              1.01651
                                                                                318.24
     573
          0.12296
                     800.05
                              1.05274
                                         800.05
                                                 0.01977
                                                            550.33
                                                                     0.08854
                                                                                434.20
     574
                     754.24
                              1.03619
                                         754.24
                                                 0.01204
                                                            543.18
                                                                     0.09137
          0.13463
                                                                                433.33
          0.14413
     576
          0.15023
                     665.08
                            1.01154
                                         665.08
                                                 0.00326
                                                            518.31
                                                                     0.09273
                                                                                415.63
```

```
626.97
     577
           0.15227
                                1.00595
                                             626.97
                                                      0.00361
                                                                  500.55
                                                                            0.09060
                                                                                        397.62
     578
           0.15015
                       595.38
                                 1.00537
                                             595.38
                                                       0.00725
                                                                   479.98
                                                                            0.08659
                                                                                        374.10
     579
           0 14441
                       570.83
                                 1 00928
                                             570.83
                                                      0.01369
                                                                   457 70
                                                                            0.08108
                                                                                        346.61
     580
           0.13614
                       553.08
                                 1.01651
                                             553.08
                                                       0.02199
                                                                   435.26
                                                                            0.07467
                                                                                        317.43
                                 1.05540
     581
           0.10857
                       821.97
                                             821.97
                                                       0.02396
                                                                   550.33
                                                                            0.05000
                                                                                        450.66
                       778.92
                                             778.92
           0.11534
                                 1.03779
                                                      0.02257
                                                                   546.11
                                                                            0.05000
                                                                                        434.37
     582
     583
           0.11845
                       737.58
                                 1.02186
                                             737.58
                                                       0.02163
                                                                   539.84
                                                                            0.05000
     584
           0.11669
                       701.25
                                 1.00916
                                             701.25
                                                       0.02134
                                                                  531.41
                                                                            0.05001
                                                                                        398.26
           0.10954
                       672.03
                                 1.00062
                                             672.03
                                                       0.02177
                                                                   520.90
                                                                            0.05001
     585
     586
           0 09728
                       651.06
                                 0.99656
                                             651.06
                                                      0.02291
                                                                   508.73
                                                                            0.05000
                                                                                        362.39
           0.08094
                       638.25
                                 0.99665
                                             638.25
                                                       0.02465
                                                                   495.53
                                                                            0.05000
     587
                                                                                        346.19
     588
           0.06223
                       632.53
                                 1.00000
                                             632.53
                                                       0.02676
                                                                   482.22
                                                                            0.05000
                                                                                        331.91
     589
           0.07616
                      1007.29
                                 1.08561
                                            1007.29
                                                      0.02698
                                                                   550.33
                                                                            0.05000
                                                                                        528.90
           0.07832
                       958.61
                                 1.06916
                                             958.61
                                                       0.02275
                                                                   550.33
                                                                            0.05000
                       913.11
870.78
     591
           0.07907
                                 1.05440
                                             913.11
                                                       0.01926
                                                                   550.33
                                                                            0.05000
                                                                                        506.20
           0.07843
                                             870.78
                                                                   550.33
     592
                                 1.04134
                                                       0.01652
                                                                            0.05000
                                                                                        493.38
     593
           0.07116
                      1003.74
                                 1.09807
                                            1003.74
                                                      0.04195
                                                                  550.33
                                                                            0.05537
                                                                                        483.22
           0.07709
                                 1.08707
                                                       0.04063
                                                                   550.33
     594
                       952.61
                                             952.61
                                                                            0.06362
                                                                                        459.06
     595
           0.08697
                       902.46
                                 1.07347
                                             902.46
                                                       0.03418
                                                                   550.33
                                                                            0.07258
                                                                                        449.08
     596
           0.09875
                       853.91
                                 1.05917
                                             853.91
                                                      0.02575
                                                                  550.33
                                                                            0.08091
                                                                                        445.73
           0.05433
                      1007.55
                                            1007.55
                                                       0.07491
                                                                            0.06700
     598
           0.07359
                       953.04
                                 1.11673
                                             953.04
                                                       0.05763
                                                                  550.33
                                                                            0.07502
                                                                                        405.30
     599
           0.09150
                       901.16
                                 1.09392
                                             901.16
                                                       0.04278
                                                                   550.33
                                                                            0.08120
     600
           0 10748
                       852.31
                                 1.07337
                                             852.31
                                                      0.03058
                                                                  550.33
                                                                            0.08557
                                                                                        429 41
     601
           0.04995
                      1027.70
                                 1.14957
                                            1027.70
                                                       0.04153
                                                                  550.33
                                                                            0.05320
                                                                                        489.90
     602
           0.06934
                       971.52
                                 1.12273
                                             971.52
                                                       0.03454
                                                                   550.33
                                                                            0.05340
     603
           0.08538
                       919.52
                                 1.09862
                                             919.52
                                                      0.02959
                                                                   550.33
                                                                            0.05282
                                                                                        477.02
                                             871.88
                                                                   550.33
     604
           0.09806
                                                       0.02626
     605
           0.07366
                      1045.48
                                 1.09892
                                            1045.48
                                                      0.03061
                                                                   550.33
                                                                            0.05000
                                                                                        536.32
           0.05824
                      1046.81
                                            1046.81
     606
                                 1.12644
                                                       0.06295
                                                                   550.33
                                                                            0.05470
                                                                                        445.20
     607
           0.03408
                      1059.48
                                 1.16944
                                            1059.48
                                                      0.09069
                                                                   550.33
                                                                            0.05866
                                                                                        369.63
                      1084.15
                                                                                        507.03
     608
           0.02995
                                 1.17548
                                            1084.15
                                                       0.04408
                                                                   550.33
                                                                            0.05115
     609
           0.07036
                      1085.67
                                 1.11326
                                            1085.67
                                                       0.03467
                                                                   550.33
                                                                            0.05000
                                                                                        543.24
     610
           0.02990
                      1098.06
                                 1.17298
                                            1098.06
                                                      0.10027
                                                                  550.33
                                                                            0.05000
                                                                                        367.06
                                                                            0.05000
           0.01000
                                 1.20167
                                            1116.82
                                                       0.10140
     612
           0.01000
                      1141 82
                                 1 20030
                                            1141 82
                                                      0 03991
                                                                  550 33
                                                                            0.05000
                                                                                        541 83
                     OPTIMIZATION SYSTEM FOR TPSSYM =
TOTAL NUMBER OF DESIGN VARIABLES =
TOTAL NUMBER OF CONSTRAINS = 1164
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    X 0.8821E+03
   1.0 B
                                                  В
                                                             В
                                                                        В
                 D
                            D
                                                                                             В
                                                                                                                   В
                                                                                                                              В
                                       D
                                                  D
                                                             D
                                                                       D
                                                                                  D
                                                                                             D
                                                                                                                             Α
                                                                                                        D
                                                                                                                   D
                                                                                                                             D
  -1.0
       .08
                    .18
                                 .28
                                              .38
                                                                       .58
                                                                                     .68
                                                                                                  .78
                                                                                                               .88
                                                                                                                            .98
                                                                                                                                      1.08
                                                           .48
                                                                 TIME ( X 1.401E-44 )
               MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:
                             550.33
        2300.33 2300.33
                                      600 33
Tmax:
Optv:
         882.09
                  882.09
                            548.74
                                     548.93
                     VALUES OF DESIGN VARIABLES :
                   DEV02
                            DEV03
                                      DEV04
                                                DEV05
                                                          DEV06
                                                                   DEV07
   1 0 01000
                 0.01000
                          0.01000
                                    0.01000
                                              0.01000
                                                       0.01000
                                                                 0 01000
                                                                           0.01000
                                                                                    0.01000
                 1.12466
                          1.13139
                                              1.06586
                                                        1.05013
       1.00000
                                    1.00000
                                                                 1.00000
                                                                           1.20693
                                                                                     1.23164
       0.00100
                 0.00100
                          0.00100
                                    0.00100
                                              0.46653
                                                        0 00100
                                                                 0.00100
                                                                           0.03518
                                                                                     0.00100
                 0.05000
                          0.05000
                                   0.05000
                                             0.05000
                                                       0.05000
    4 0.05000
                                                                 0.05000
                                                                           0.05000
                                                                                    0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                         284.9608765
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.7809880
```

5-90

THE TOTAL OPTIMAL WEIGHT = 9.88459207E+04

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1314E+01
  1.0
                                                                                  A A A A A A
                                                                        AA AA
          A A A A A A
                                               A A
 -1.0
      .02
                .12
                             .22
                                       .32
                                                      .42
                                                                   .52
                                                                                           .72
                                                                                                       .82
                                                                                                                   .92
                                                                                                                             1.02
                                                           TIME ( X 7.006E-44 )
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
(WITH AVERAGE THICKNESS)
                    HRSI COAT thin skin
                                                                0.01000 in. 882.1 F
-----
                                                                ----
                      LI-900 (P)
                                                                1.09003 in. 882.1 F
                                           slab
                     RTV-560 thin skin
                      17 LB SIP .16 IN
                                                                0.05000 in. 548.9 F
_____
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                              LAYER02
  PANEL
          LAYER01
                                                   LAYER03
                                                                       LAYER04
                                          882 09
                                                              550 33
    717
          0.01000
                     882 09
                              1.13139
                                                   0.00100
                                                                       0.05000
                                                                                  548 93
                              1.14181
          0.01000
                     868.91
                                          868.91
                                                   0.00109
                                                              550.32
                                                                       0.05000
                                                                                  536.52
                              1.14462
1.13983
                                                  0.00115
0.00103
     719
          0.01000
                     855.28
                                          855.28
                                                              550.31
                                                                       0.05000
                                                                                  525.68
                                                              550.33
                                                                       0.05000
     720
          0.01000
                     841.17
                                          841.17
                                                                                  516.51
     721
          0.01000
                     867.74
                              1.10113
                                          867.74
857.56
                                                   0 00117
                                                              550.33
                                                                       0.05000
                                                                                  545.37
          0.01000
                     857.56
                              1.11220
                                                   0.06981
                                                                       0.05000
     722
                                                              542.14
                                                                                  483.43
     723
          0.01000
                     847.04
                                          847.04
                                                   0.11796
                                                              535.02
                                                                       0.05000
     724
          0.01000
                     836.13
                              1.11384
                                          836.13
                                                   0.14612
                                                              530.83
                                                                       0.05000
                                                                                  409.83
     725
          0.01000
                     852.30
                                          852.30
                                                   0.00152
                                                              550.33
                                                                       0.05000
                                                                                  539.39
     726
          0.01000
                     844.82
                              1 08928
                                          844.82
                                                   0 12798
                                                              534.00
                                                                       0.05000
                                                                                  435 41
                     837.08
     727
                              1.09466
                                          837.08
                                                              520.75
                                                                       0.04999
          0.01000
                                                   0.21635
                                                                                  361.65
     728
          0.01000
                     829.05
                               1.09381
                                          829.05
                                                   0.26762
                                                              513.03
                                                                       0.04999
                     835.75
                                                   0.00173
     729
          0.01000
                              1.06093
                                          835.75
                                                              550.33
                                                                       0.05000
                                                                                  531.20
     730
          0.01000
                      830.66
                               1.07304
                                          830.66
                                                   0.17501
                                                              525.96
                                                                       0.04999
     731
          0.01000
                     825.38
819.90
                              1.07929
                                          825.38
                                                   0.29586
                                                              507.55
                                                                       0.04999
                                                                                  295.77
     732
                              1.07968
                                          819.90
                                                              496.97
          0.01000
                                                   0.36515
                                                                       0.04999
    733
734
          0.01000
                     806.89
                              1.07073
                                          806.89
                                                   0.44556
                                                              481.00
                                                                       0.04999
                                                                                  168.91
                                                   0.49066
          0.01000
                              1.06926
                                                                       0.04998
                      792.02
                                          792.02
                                                              468.36
                                                                                  152.18
     735
          0.01000
                      772.43
                               1.07546
                                          772.43
                                                   0.50691
                                                              456.90
                                                                       0.04998
                              1.09106
     736
          0.01000
                     748.09
                                          748.09
                                                   0.48503
                                                              447.71
                                                                       0.04999
                                                                                  152.18
          0.01000
                                          719.43
                                                   0.42105
                                                              441.48
                                                                       0.04999
     738
          0.01000
                     687 88
                              1 15080
                                          687 88
                                                   0 31841
                                                              438 50
                                                                       0 04999
                                                                                  152 18
     739
          0.01000
                     654.81
                              1.19148
                                          654.81
                                                   0.18509
                                                              438.47
                                                                       0.05000
                                                                                  188.40
    740
741
                     622.04
809.92
                              1.23544
1.06947
                                          622.04
809.92
                                                  0.03356
0.36055
                                                              440.78
494.24
                                                                       0.05000
0.04999
                                                                                  259.49
          0.01000
          0.01000
                                                                                  236.16
     742
          0.01000
                      793.27
                               1.06777
                                          793.27
                                                   0.39659
                                                              483.38
                                                                       0.04999
                                                                                  194.81
     743
          0.01000
                      772.29
                              1.07438
                                          772.29
                                                   0.40931
                                                              473.07
                                                                       0.04999
                                                                                  164.87
                                          747.13
     744
          0.01000
                                                   0.39140
                                                                       0.04999
                                                              464.14
                                                                                  152.18
     745
          0.01000
                     718.18
                              1.11897
                                          718.18
                                                   0.33923
                                                              457.10
                                                                       0.04999
                                                                                  157.45
     746
          0.01000
                     687.41
                              1.15570
                                          687.41
                                                   0.25688
                                                              452.41
                                                                       0.04999
                                                                                  182.05
     747
          0.01000
                     655.74
                              1.19936
                                          655.74
                                                   0.15031
                                                              449.81
                                                                       0.05000
                                                                                  222.16
     748
          0.01000
                     624.33
                               1.24727
                                          624.33
                                                   0.02735
                                                              449.03
                                                                       0.05000
                                                                                  273.69
     749
          0.01000
                      812.84
                               1.06260
                                          812.84
                                                   0.21249
                                                              517.32
                                                                       0.04999
                                                                                  353.05
     750
          0.01000
                     794.51
                              1.06067
                                          794.51
                                                   0.23341
                                                              509.55
                                                                       0.04999
                                                                                  323.04
     751
                      772.19
                                          772.19
                                                   0.24069
                                                              501.25
                                                                       0.04999
     752
          0.01000
                      746.27
                              1.08462
                                          746.27
                                                   0 23003
                                                              492 84
                                                                       0 04999
                                                                                  280 47
     753
                                                   0.19928
                                                              484.59
                                                                       0.04999
          0.01000
                      717.14
                              1.11333
                                          717.14
                                                                                  272.65
                                                              477.04
470.35
     754
          0.01000
                     686.90
                              1.15131
                                          686.90
                                                   0.15104
                                                                       0.05000
                                                                                  274.65
     755
          0.01000
                              1.19640
                                                   0.08850
                                                                       0.05000
                                                                                  285.32
                     656.35
                                          656.35
     756
          0.01000
                      626.42
                              1.24600
                                          626.42
                                                   0.01646
                                                              464.45
                                                                       0.05000
                                                                                  302.47
                     815.68
795.74
                                          815.68
795.74
     757
          0.01000
                              1.05013
                                                   0.00100
                                                              550.33
                                                                       0.05000
                                                                                  519.89
     758
                               1.04797
                                                              546.89
          0.01000
                                                   0.00105
                                                                       0.05000
                                                                                  506.13
                                                              541.47
533.81
     759
          0.01000
                      772.16
                               1.05439
                                          772.16
                                                   0.00100
                                                                       0.05000
                                                                                  487.94
                      745.49
                               1.07135
                                          745.49
                                                   0.00110
                                                                       0.05000
     760
          0.01000
                                                                                  465.08
     761
          0.01000
                      716.40
                               1.09956
                                          716.40
                                                   0.00108
                                                              523.98
                                                                       0.05000
                                                                                  438.04
     762
          0.01000
                                          686.44
                                                   0.00105
                                                                       0.05000
                     686.44
                              1.13745
                                                              512.49
                                                                                  408.23
          0.01000
                     628.31
                              1.23164
                                          628.31
                                                   0.00100
                                                              487.03
                                                                       0.05000
                                                                                  345.75
```

```
938
           0.01000
                       824.20
                                 1.12466
                                             824.20
                                                       0.00100
                                                                   550.33
                                                                             0.05000
                                                                                         507.73
     939
           0.01000
                        804.36
                                 1.09531
                                              804.36
                                                       0.00100
                                                                   550.33
                                                                             0.05000
                                                                                         500.32
     940
           0.01000
                        784.19
                                 1 05407
                                              784.19
                                                       0 00100
                                                                   550 33
                                                                             0.05000
                                                                                         495 61
     941
           0.01000
                        763.10
                                 1.00000
                                              763.10
                                                       0.00100
                                                                   550.33
                                                                             0.05000
                                                                                         493.41
                       822.95
807.78
                                             822.95
807.78
     945
           0.01000
                                 1.10213
                                                       0.15435
                                                                   529.55
                                                                             0.05000
                                                                                         396.91
                                 1.07831
     946
           0.01000
                                                       0.13262
                                                                   532.65
                                                                             0.05000
                                                                                         408.13
     947
            0.01000
                        792.82
                                  1.04517
                                              792.82
                                                       0.08258
                                                                    539.91
                                                                             0.05000
                                                                                         443.17
     948
           0.01000
                        776.93
                                 1.00075
                                              776.93
                                                       0.00241
                                                                   550.33
                                                                             0.05000
                                                                                         503.04
     952
            0.01000
                        819.44
                                  1.08502
                                              819.44
                                                       0.28122
                                                                    510.90
                                                                             0.04999
                                                                                         302.34
     953
           0.01000
                       808.47
                                 1.06579
                                             808.47
                                                       0.24054
                                                                   516.86
                                                                             0.04999
                                                                                         330.09
                                              797.62
                                                       0.14901
     954
           0.01000
                        797.62
                                  1.03821
                                                                             0.05000
                                                                                         398.48
                                                                    530.38
     955
            0.01000
                        786.04
                                 1.00050
                                              786.04
                                                       0.00304
                                                                    550.33
                                                                             0.05000
                                                                                         510.05
     959
           0.01000
                        813.49
                                 1.07307
                                              813.49
                                                       0.38205
                                                                   494.35
                                                                             0.04999
                                                                                         223.63
     960
            0.01000
                                  1.05728
                                              806.19
                                                       0.32700
                                                                    502.64
                                                                             0.04999
     961
           0.01000
                        798.71
                                 1.03308
                                              798.71
                                                       0.20008
                                                                   521.83
                                                                             0.04999
                                                                                         361.83
                        790.83
                                  1.00000
                                              790.83
                                                       0.00100
                                                                    550.33
     962
            0.01000
                                                                             0.05000
    1205
           0.01000
                       608.85
                                 1.00000
                                              608.85
                                                       0.00100
                                                                   499.36
                                                                             0.05000
                                                                                         390.27
           0.01000
                                                       0.01912
                                                                             0.05000
                                                                                         325.69
    1206
                        612.60
                                 1.08829
                                             612.60
                                                                   469.03
    1207
            0.01000
                        616.08
                                  1.15717
                                              616.08
                                                       0.03050
                                                                   449.27
                                                                             0.05000
                                                                                         282.55
    1208
           0.01000
                       619.32
                                 1.20693
                                             619.32
                                                       0.03518
                                                                   440.00
                                                                             0.05000
                                                                                         260.69
    1212
            0.01000
                                  1.00010
                                              650.61
                                                       0.00115
                                                                    509.73
                                                                             0.05000
    1213
           0.01000
                       651.77
                                 1.07276
                                             651.77
                                                       0.10377
                                                                   471.90
                                                                             0.05000
                                                                                         298.84
    1214
            0.01000
                        652.83
                                  1.12897
                                              652.83
                                                       0.16770
                                                                   447.62
                                                                             0.05000
                                                                                         220.72
    1215
           0.01000
                       653.80
                                 1 16932
                                             653.80
                                                       0 19382
                                                                   436.63
                                                                             0 04999
                                                                                         184 53
           0.01000
                       690.44
                                 1.00008
                                              690.44
                                                       0.00125
                                                                   519.91
                                                                             0.05000
                                                                                         447.96
    1219
    1220
            0.01000
                        689.69
                                  1.05834
                                              689.69
                                                       0.17798
                                                                    476.04
                                                                             0.04999
                                                                                         278.58
    1221
           0.01000
                        689.00
                                 1.10287
                                              689.00
                                                       0.28841
                                                                    448.11
                                                                             0.04999
                                                                                         170.28
                                                       0.33439
                                                                    435.73
    1222
                                              688.38
    1226
           0.01000
                        725.54
                                 1.00016
                                              725.54
                                                       0.00185
                                                                   529.10
                                                                             0.05000
                                                                                         472.15
    1227
                        723.81
                                              723.81
            0.01000
                                  1.04638
                                                       0.23564
                                                                    481.35
                                                                             0.04999
                                                                                         266.98
    1228
           0.01000
                        722.23
                                 1.08110
                                              722.23
                                                       0.38163
                                                                    451.16
                                                                             0.04999
                                                                                         152.18
                        720.78
           0.01000
                                 1.10489
                                              720.78
                                                                             0.04999
                                                                                         152.18
    1229
                                                       0.44258
                                                                    438.03
                                                                   536.90
    1233
            0.01000
                        753.85
                                  1.00021
                                              753.85
                                                       0.00257
                                                                             0.05000
                                                                                         491.28
    1234
           0.01000
                        752.20
                                 1.03747
                                              752.20
                                                       0.27170
                                                                   487.90
                                                                             0.04999
                                                                                         266.14
            0.01000
                        750.68
                                  1.06493
                                              750.68
                                                       0.43954
                                                                             0.04999
                                             749.26
773.94
    1236
           0.01000
                       749.26
                                 1 08306
                                                       0 50938
                                                                   443 86
                                                                             0.04998
                                                                                         152 18
    1240
           0.01000
                        773.94
                                 1.00015
                                                       0.00238
                                                                   543.08
                                                                             0.05000
                                                                                         505.16
    1241
           0.01000
                        773.45
                                 1.03194
                                              773.45
                                                       0 28319
                                                                   495.56
                                                                             0 04999
                                                                                         277 07
    1242
           0.01000
                        773.02
                                 1.05500
                                              773.02
                                                       0.45878
                                                                   465.68
                                                                             0.04999
                                                                                         152.18
    1243
           0.01000
                        772.66
                                 1.06968
                                             772.66
                                                       0.53198
                                                                   452.99
                                                                             0.04998
                                                                                         152.18
    1247
           0.01000
                        786.01
                                 1.00008
                                              786.01
                                                       0.00177
                                                                   547.51
                                                                             0.05000
                                                                                         513.56
                        787.59
                                              787.59
                                                       0.27292
    1248
            0.01000
                                  1.02971
                                                                    503.84
                                                                             0.04999
                                                                                         297.64
    1249
           0.01000
                        789.12
                                 1.05104
                                              789.12
                                                       0.44331
                                                                    476.30
                                                                             0.04999
                                                                                         161.41
    1250
                        790.62
                                  1.06433
                                              790.62
                                                       0.51449
                                                                    464.67
                                                                             0.04998
            0.01000
                                                                                         152.18
    1254
           0.01000
                        791.19
                                  1.00000
                                              791.19
                                                       0.00100
                                                                    550.33
                                                                             0.05000
                                                                                         517 11
           0.01000
                        795.46
                                 1.03017
                                              795.46
                                                       0.24627
                                                                   512.15
                                                                             0.04999
    1255
                                                                                         324.58
    1256
            0.01000
                        799.53
                                  1.05199
                                              799.53
                                                       0.40154
                                                                    487.94
                                                                             0.04999
                                                                                         202.81
    1257
           0.01000
                       803 43
                                 1 06556
                                             803 43
                                                       0 46653
                                                                   477 76
                                                                             0 04999
                                                                                         152 18
                     OPTIMIZATION SYSTEM FOR TPSSYM =
TOTAL NUMBER OF DESIGN VARIABLES = 36
 TOTAL NUMBER OF CONSTRAINS = 876
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    Х
        0.7957E+03
   1.0 B
                  D
                                                              в
                                                                         В
                             D
                                        D
                                                                                                                    В
                                                                                                                               В
                                                                         D
                                                                                    D
                                                                                                                               Α
  -1.0
                                              .38
                                                                        .58
                                                                                                   .78
                                                                                                                .88
                                                                                                                             .98
                    .18
                                 .28
                                                           .48
                                                                                                                                        1.08
                                                                  TIME ( X 1.401E-44 )
                MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:
        1 2 3
2300.33 2300.33 550.33
```

5-92

600.33

520.52

SR DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09 1 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000

VALUES OF DESIGN VARIABLES :

Tmax:

Optv:

795.73

795.73 520.52

```
2 1.00000
              1.00000
                       1.00000 1.00000 1.00000 1.00000
                                                          1.00000 1.00000
                                                                            1.00000
               0.00100
                        0.00100
                                 0.00100
                                         0.00100
                                                  0.00100
                                                           0.00100
                                                                   0.00100
      0.05000
               0.05000
                       0.05000
                                0.05000 0.05000
                                                 0.05000
                                                          0.05000 0.05000
                                                                            0.05000
 THE ORIGINAL OBJECTIVE FUNCTION =
                                     178.1200104
 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.3081630
 THE TOTAL OPTIMAL WEIGHT = 2.60391281E+04
 OBJECTIVE FUNCTION VS ITERATIONS :
    1 0.3081630
2 0.3081630
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
       0.3082E+00
   Х
  0.0 +-----
  -1.0
                                                      .40 1.50 1.60
TIME ( X 0.000E+00 )
                           1.20 1.30
                                                                          1.60
      1 00
               1.10
                                                                                       1.70
                                                                                                   1.80
                                                                                                             1.90
                                                                                                                         2.00
              OPTIMAL STRUCTURES OF TPS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
 _____
                                                              0.01000 in. 795.7 F
                     HRSI COAT
                                         thin skin
                     LI-900 (P)
                                          slab
                                                             1.00000 in. 795.7 F
                     RTV-560
                                         thin skin
                                                              0.00100 in. 520.5 F
                                                              0.05000 in. 520.5 F
                     17 LB SIP .16 IN
                                          slab
 _____
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                            22
  PANEL
          LAYER01
                             LAYER02
                                                 LAYER03
                                                                    LAYER04
    942
          0.01000
                     704.32
                             1.00000
                                        704.32
                                                 0.00100
                                                            550.33
                                                                    0.05000
                    653.23
605.23
                                        653.23
605.23
                                                 0.00100
                                                           523.73
494.04
                                                                               415.76
383.55
     943
          0.01000
                             1.00000
                                                                    0.05000
          0.01000
     944
                             1.00000
                                                                    0.05000
     949
          0.01000
                     733.58
                             1.00000
                                        733.58
                                                 0.00100
                                                                    0.05000
     950
          0.01000
                     700.05
                             1.00000
                                        700.05
                                                 0.00100
                                                            533.25
                                                                    0.05000
                                                                               449.96
          0.01000
                     667.22
                             1.00000
                                        667.22
                                                 0.00100
                                                            512.37
                                                                    0.05000
     956
          0.01000
                     756 61
                             1 00000
                                        756 61
                                                 0.00100
                                                            550 33
                                                                    0.05000
                                                                               490 34
                     738.34
     957
          0.01000
                             1.00000
                                        738.34
                                                 0.00100
                                                            540.75
                                                                    0.05000
                                                                               478.02
                     718.91
773.45
                             1.00000
                                        718.91
773.45
                                                 0.00100
0.00100
                                                            527.65
550.33
                                                                    0.05000
0.05000
     958
          0.01000
                                                                               465.11
          0.01000
     963
                                                                               503.18
     964
          0.01000
                     768.22
                              1.00000
                                        768.22
                                                 0.00100
                                                            546.30
                                                                    0.05000
                                                                               500.04
    965
          0.01000
                     760.23
                             1.00000
                                        760.23
                                                 0.00100
                                                            539.86
                                                                    0.05000
                                                                               494.84
    1202
          0.01000
                     597.17
                              1.00000
                                                 0.00100
                                                            489.75
                                                                    0.05000
   1203
          0.01000
                     601.29
                             1.00000
                                        601.29
                                                 0.00100
                                                            493.13
                                                                    0.05000
                                                                               385.37
    1204
          0.01000
                     605.09
                             1.00000
                                        605.09
                                                 0.00100
                                                            496.26
                                                                    0.05000
                                                                               387.83
   1209
          0.01000
                     668.58
                             1.00000
                                        668.58
                                                 0.00100
                                                            511.27
                                                                    0.05000
                                                                               433.04
   1210
          0.01000
                     663.04
                             1.00000
                                        663.04
                                                 0.00100
                                                            509.18
                                                                    0.05000
                                                                               429.16
    1211
          0.01000
                     655.06
                              1.00000
                                        655.06
                                                 0.00100
                                                            507.34
                                                                    0.05000
                                                                               423.25
   1216
          0.01000
                     731.95
                             1.00000
                                        731.95
                                                 0.00100
                                                            530.40
                                                                    0.05000
                                                                               477.60
    1217
                     718.58
                                        718.58
                                                 0.00100
                                                            523.94
                                                                    0.05000
   1218
          0.01000
                     701.06
                             1.00000
                                        701.06
                                                 0.00100
                                                            518.16
                                                                    0.05000
                                                                               455 73
                     780.97
                                        780.97
                                                 0.00100
                                                                    0.05000
                                                                               511.97
    1223
          0.01000
                             1.00000
                                                            545.25
                                        762.85
739.37
                                                 0.00100
0.00100
   1224
          0.01000
                     762.85
                             1.00000
                                                            536.17
                                                                    0.05000
                                                                               499.57
                             1.00000
   1225
          0.01000
                                                                    0.05000
                     739.37
                                                            528.03
                                                                               482.64
   1230
          0.01000
                     795.73
                              1.00000
                                        795.73
                                                 0.00100
                                                            550.33
                                                                    0.05000
                                                                               520.52
                     792.52
767.36
                                        792.52
767.36
   1231
          0.01000
                             1.00000
                                                 0.00100
                                                            545.04
                                                                    0.05000
                                                                               520.21
    1232
                              1.00000
                                                 0.00100
          0.01000
                                                            536.41
                                                                    0.05000
                                                                               502.04
                     795.73
795.73
   1237
          0.01000
                              1.00000
                                        795.73
                                                 0.00100
                                                            550.33
                                                                    0.05000
                                                                               520.52
          0.01000
                              1.00000
                                        795.73
                                                 0.00100
                                                            550.14
                                                                    0.05000
    1238
                                                                               520.52
                                        783.66
795.73
    1239
          0.01000
                     783.66
                              1.00000
                                                 0.00100
                                                            542.91
                                                                     0.05000
                                                                               512.97
                     795.73
                             1.00000
                                                 0.00100
                                                            550.33
                                                                    0.05000
   1244
          0.01000
                                                                               520.52
                                                                    0.05000
                     789.01
   1246
          0.01000
                             1.00000
                                        789.01
                                                 0.00100
                                                            547.49
                                                                    0.05000
                                                                               515.99
```

```
1251
           0.01000
                       795.73
                                1.00000
                                            795.73
                                                     0.00100
                                                                 550.33
                                                                          0.05000
                                                                                       520.51
    1252
           0.01000
                       792.80
                                1.00000
                                            792.80
                                                      0.00100
                                                                 550.33
                                                                           0.05000
                                                                                       518.34
    1253
           0.01000
                       785.51
                                1 00000
                                            785.51
                                                     0.00100
                                                                 550.33
                                                                           0.05000
                                                                                       512.67
                                            561.42
                                                      0.00100
                                                                                       355.39
    1590
           0.01000
                       561.42
                                1.00000
                                                                 461.38
                                                                           0.05000
                                1.00000
                                                                 425.30
                                                                           0.05000
    1591
           0.01000
                       520.75
                                            520.75
                                                      0.00100
                                                                                       330.54
                                1.00000
                                                     0.00100
                                                                 489.56
    1598
           0.01000
                       636.38
                                            636.38
                                                                           0.05000
                                                                                       408.05
    1599
           0.01000
                       606.51
                                1.00000
                                            606.51
                                                      0.00100
                                                                  464.46
                                                                           0.05000
                                                                                       389.43
    1606
           0.01000
                       699.30
                                1.00000
                                            699.30
                                                      0.00100
                                                                 513.41
                                                                           0.05000
                                                                                       452.29
    1607
           0.01000
                       678.80
                                1.00000
                                            678.80
                                                      0.00100
                                                                 497.82
                                                                           0.05000
                       750.17
737.62
    1614
           0.01000
                                1.00000
                                            750.17
                                                     0.00100
                                                                 532.90
                                                                           0.05000
                                                                                       488.09
                                1.00000
                                            737.62
                                                      0.00100
                                                                           0.05000
           0.01000
                                                                 525.35
                                                                                       479.47
    1615
    1622
           0.01000
                       794.76
                                1.00000
                                            794.76
                                                      0.00100
                                                                  550.32
                                                                           0.05000
                                                                                       519.53
    1623
           0.01000
                       789.66
                                1.00000
                                            789.66
                                                     0.00100
                                                                 550.33
                                                                           0.05000
                                                                                       515.20
    1630
           0.01000
                       795.73
795.73
                                 1.00000
                                            795.73
                                                      0.00100
                                                                  550.33
                                                                           0.05000
    1631
           0.01000
                                1.00000
                                            795.73
                                                     0.00100
                                                                 550.33
                                                                           0.05000
                                                                                       520.52
                       795.73
                                 1.00000
                                                      0.00100
                                                                  550.33
                                                                           0.05000
    1638
           0.01000
                                                                                       520.52
    1639
           0.01000
                       795.73
                                1.00000
                                            795.73
                                                     0.00100
                                                                 550.33
                                                                           0.05000
                                                                                       520.52
           0.01000
                       795.73
                                1.00000
                                            795.73
                                                     0.00100
                                                                 550.33
                                                                           0.05000
    1646
                                                                                       520.52
    1647
           0.01000
                       795.73
                                1.00000
                                            795.73
                                                      0.00100
                                                                  550.33
                                                                           0.05000
                                                                                       520.52
    1654
           0.01000
                       793.38
                                1.00000
                                            793.38
                                                     0.00100
                                                                 550.33
                                                                           0.05000
                                                                                       519.60
           0.01000
                                 1.00000
                                                      0.00100
                                                                           0.05000
    1662
           0.01000
                       740.90
                                1.00000
                                            740.90
                                                     0.00100
                                                                 537.46
                                                                           0.05000
                                                                                      483.09
    1663
           0.01000
                       745.65
                                 1.00000
                                            745.65
                                                      0.00100
                                                                  545.14
                                                                           0.05000
    1670
           0.01000
                       671.60
                                1 00000
                                            671.60
                                                     0.00100
                                                                 513.60
                                                                           0.05000
                                                                                       434 84
    1671
           0.01000
                       672.26
                                1.00000
                                            672.26
                                                     0.00100
                                                                 516.18
                                                                           0.05000
                                                                                       434.67
    1678
           0.01000
                       592.76
                                 1.00000
                                            592.76
                                                      0.00100
                                                                           0.05000
    1679
           0.01000
                       588.05
                                1.00000
                                            588.05
                                                     0.00100
                                                                 482.28
                                                                          0.05000
                                                                                      376.86
                    OPTIMIZATION SYSTEM FOR TPSSYM =
 TOTAL NUMBER OF DESIGN VARIABLES =
 TOTAL NUMBER OF CONSTRAINS = 972
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
        0.7689E+03
  X (
                            В
                                       В
                                                            В
                                                                      В
                                                                                            В
                 D
                                                            D
                                                                                           D
                                                                                                                           Α
                                                                                                                 D
                                                                                                                           D
   0.0
  -1.0
                                .28
                                                                                                             .88
       0.8
                   .18
                                             .38
                                                                       .58
                                                                                                .78
                                                                                                                         .98
                                                                                                                                    1.08
                                                                TIME ( X 1.401E-44 )
               MAXIMUM TEMPERATURE OF EVERY LAYER
                       2
                           3 4
550.33 600.33
LAYER:
        2300.33 2300.33
Tmax:
         768.93
                  768.93
                           498.81
                                     498.81
                    VALUES OF DESIGN VARIABLES :
                  DEV02
                           DEV03
                                              DEV05
LAYER
         DEV01
                                    DEV04
                                                        DEV06
                                                                  DEV07
                                                                            DEV08
                                                                                     DEV09
                          0.01000
                                   0.01000
                                             0.01000
       0.01000
                0.01000
                                                      0.01000
                                                                0.01000
                                                                          0.01000
      1.00000
                1.00000
                          1.00000
                                   1.00000
                                             1.00000
                                                      1.00000
                                                                1.00000
                                                                         1.00000
                                                                                   1.00000
                0.00100
                          0.00100
                                   0.00100
                                             0.00100
                                                       0.00100
                                                                0.00100
                                                                          0.00100
                                                                                   0.00100
       0.05000
                0.05000 0.05000 0.05000 0.05000
                                                      0.05000 0.05000
                                                                         0.05000
 THE ORIGINAL OBJECTIVE FUNCTION =
                                         213.8315887
 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.3081630
 THE TOTAL OPTIMAL WEIGHT = 3.15029699E+04
 OBJECTIVE FUNCTION VS ITERATIONS :
           1 0.3081630
2 0.3081630
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
       0.3082E+00
   1.0 A
```

```
-1.0
                                                      1.40 1.50 1.6
TIME ( X 0.000E+00 )
                                                                            1.60
     1.00
                 1.10
                             1.20
                                          1.30
                                                                                           1.70
                                                                                                       1.80
                                                                                                                   1.90
                                                                                                                             2.00
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
_____
                     HRSI COAT thin skin
                                                                0.01000 in.
                                                                             768.9 F
                                                               ----
_____
                                                                1.00012 in.
                     T-T-900 (P)
                                           slab
                                                                             768.9 F
_____
                                                                0.00100 in.
                                                                             498.8 F
                    RTV-560 thin skin
                     17 LB SIP .16 IN
                                                                0.05001 in.
        THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
 PANEL
                              LAYER02
                                                                       LAYER04
  1592
         0.01000
0.01000
                     481.34
                             1.00000
                                         481.34
                                                  0.00100
0.00100
                                                              393.28
                                                                      0.05000
                                                                                  305.89
                     443.26
                                         443.26
                                                              361.47
                                                                                  280.48
  1593
  1594
         0.01000
                     409.40
                             1.00000
                                         409.40
                                                  0.00100
                                                              333.46
                                                                       0.05000
                                                                                  258.10
                     381.06
                             1.00000
                                                  0.00100
                                                              310.05
                                                                       0.05000
  1595
         0.01000
                                         381.06
                                                                                  239.63
  1596
          0.01000
                     356.14
                             1.00000
                                         356.14
                                                  0.00100
                                                              289.75
                                                                       0.05000
                                                                                  223.67
  1597
         0.01000
                     335.53
                             1 00000
                                         335 53
                                                  0.00100
                                                              273 18
                                                                       0.05000
                                                                                  210 83
                     572.51
                                                                                  367.06
   1600
         0.01000
                             1.00000
                                         572.51
                                                  0.00100
                                                              442.24
                                                                       0.05000
                     541.51
513.20
                             1.00024
  1601
         0.01000
                                         541.51
                                                  0.00100
                                                              420.37
                                                                       0.05001
                                                                                  345 78
                                                                       0.05002
         0.01000
                                         513.20
                                                  0.00100
                                                              401.26
                                                                                  326.56
   1602
  1603
         0 01000
                     488.63
                              1.00037
                                         488.63
                                                  0 00100
                                                              385.55
                                                                       0.05002
                                                                                  310 09
                              1.00025
                                                  0.00100
                                                                       0.05001
  1604
         0.01000
                     465.12
                                         465.12
                                                              371.50
                                                                                  294.58
  1605
          0.01000
                     443.99
                              1.00000
                                         443.99
                                                  0.00100
                                                              359.98
                                                                       0.05000
                                                                                  280.93
  1608
         0.01000
                     649.54
                             1.00000
                                         649.54
                                                  0.00100
                                                              484.00
                                                                      0.05000
                                                                                  418.73
  1609
         0.01000
                     624.85
                              1.00044
                                         624.85
                                                  0.00100
                                                              470.75
                                                                       0.05002
                                                                                  401.18
  1610
         0.01001
                     601.15
                              1.00066
                                         601 15
                                                  0 00100
                                                              459.05
                                                                       0.05003
                                                                                  384 59
                     579.65
                              1.00067
                                         579.65
                                                  0.00100
                                                                       0.05003
  1611
         0.01001
                                                              449.65
                                                                                  369.74
          0.01000
                     557.85
                              1.00046
                                         557.85
                                                  0.00100
                                                              441.18
                                                                       0.05002
                                                                                  354.96
   1612
                                                                       0.05000
  1613
         0.01000
                     536.68
                              1.00001
                                         536.68
                                                  0.00100
                                                              434.13
                                                                                  340.90
   1616
          0.01000
                              1.00000
                                         712.56
                                                  0.00100
                                                              518.63
                                                                       0.05000
  1617
         0.01001
                     693.40
                              1.00059
                                         693.40
                                                  0.00100
                                                              512.59
                                                                       0.05003
                                                                                  446.78
                     673.61
                                         673.61
                                                              507.05
   1618
          0.01001
                              1.00089
                                                  0.00100
                                                                       0.05004
                                                                                  432.43
  1619
         0.01001
                     654.49
                              1.00091
                                         654.49
                                                  0.00100
                                                              502.81
                                                                       0.05005
                                                                                  418.82
                              1.00062
                     634.42
                                                  0.00100
   1620
         0.01001
                                         634.42
                                                              499.00
                                                                       0.05003
                                                                                  404.87
   1621
          0.01000
                     613.61
                              1.00003
                                          613.61
                                                  0.00100
                                                              495.68
                                                                       0.05000
  1624
         0.01000
                     768.93
                              1.00000
                                         768.93
                                                  0.00100
                                                              550.33
                                                                       0.05000
                                                                                  498.81
          0.01001
                              1.00073
                                          754.46
                                                  0.00100
                                                              550.33
                                                                       0.05004
   1625
  1626
         0.01001
                     738 20
                              1 00110
                                         738 20
                                                  0.00100
                                                              550 33
                                                                      0.05005
                                                                                  475 07
   1627
         0.01001
                     720.99
                              1.00110
                                          720.99
                                                  0.00100
                                                              550.33
                                                                       0.05006
                                                                                  462.45
                     701.89
680.80
                              1.00074
                                                  0.00100
0.00100
                                                              550.33
550.33
                                                                      0.05004
0.05000
  1628
         0.01001
                                         701.89
                                                                                  448.89
   1629
         0.01000
                                         680.80
                                                                                  434.31
  1632
         0.01000
                     768.93
                              1.00000
                                         768.93
                                                  0.00100
                                                              550.33
                                                                       0.05000
                                                                                  498.81
  1633
         0.01001
                     768.93
                              1.00081
                                         768.93
                                                  0.00100
                                                              550.33
                                                                      0.05004
                                                                                  498.81
                     768.93
                              1.00121
                                         768.93
                                                  0.00100
                                                              550.33
                                                                       0.05006
   1634
          0.01001
  1635
         0.01001
                     765.17
                              1.00121
                                         765.17
                                                  0.00100
                                                              550.33
                                                                      0.05006
                                                                                  491.53
   1636
          0.01001
                     746.84
                              1.00081
                                          746.84
                                                  0.00100
                                                              550.33
                                                                       0.05004
                                                                                  478.32
  1637
         0.01000
                     725.65
                              1.00000
                                         725.65
                                                  0.00100
                                                              550.33
                                                                       0.05000
                                                                                  463.52
  1640
         0.01000
                     768.93
                              1.00000
                                         768.93
                                                  0.00100
                                                              550.33
                                                                       0.05000
                                                                                  498.81
  1641
          0.01001
                     768.93
                              1.00083
                                         768.93
                                                  0.00100
                                                              550.33
                                                                       0.05004
                                                                                  498.81
  1642
         0.01001
                     768.93
                              1.00125
                                         768.93
                                                  0.00100
                                                              550.33
                                                                      0.05006
                                                                                  498.81
   1643
                     768.93
                              1.00125
                                          768.93
                                                  0.00100
                                                              550.33
  1644
         0.01001
                     768 93
                              1.00083
                                         768 93
                                                  0.00100
                                                              550.33
                                                                       0.05004
                                                                                  497 06
                     754.72
                                                  0.00100
                                                              550.33
                                                                       0.05000
                                                                                  482.62
   1645
         0.01000
                              1.00000
                                         754.72
                              1.00000
1.00079
  1648
         0.01000
                     768.93
                                         768.93
                                                  0.00100
                                                              550.33
                                                                       0.05000
                                                                                  498.81
                                                  0.00100
                                                              550.33
         0.01001
                                         768.93
                                                                       0.05004
  1649
                     768.93
                                                                                  498.81
  1650
         0.01001
                     768.93
                              1.00119
                                         768.93
                                                  0.00100
                                                              550.33
                                                                       0.05006
                                                                                  498.81
                              1.00118
  1651
         0.01001
                     768.93
                                         768.93
                                                  0.00100
                                                              550.33
                                                                       0.05006
                                                                                  498.81
                     768.93
                                          768.93
                                                              550.33
   1652
          0.01001
                                                  0.00100
                                                                       0.05004
                                                                                  498.81
  1653
         0.01000
                     761.66
                              1.00000
                                         761.66
                                                  0.00100
                                                              550.33
                                                                       0.05000
                                                                                  487.51
                              1.00000
                                                  0.00100
                                                                       0.05000
   1656
         0.01000
                                         768.93
                                                              550.33
                                                                                  498.81
                     768.93
                                         768.93
768.93
  1657
          0.01001
                     768.93
                              1.00068
                                                  0.00100
                                                              550.33
                                                                       0.05003
                                                                                  498.81
                     768.93
                                                              550.33
                                                                       0.05005
  1658
         0.01001
                              1.00102
                                                  0.00100
                                                                                  498.81
                                                                       0.05005
  1660
         0.01001
                     759.69
                              1.00068
                                         759.69
                                                  0.00100
                                                              550.33
                                                                       0.05003
                                                                                  487.70
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1661
          0.01000
                      743.41
                              1.00000
                                          743.41
                                                   0.00100
                                                              550.33
                                                                       0.05000
                                                                                   476.21
    1664
           0.01000
                      738.71
                               1.00000
                                          738.71
                                                   0.00100
                                                              550.33
                                                                       0.05000
                                                                                   478.32
    1665
           0.01000
                      736.15
731.15
                               1.00050
                                          736.15
                                                   0.00100
                                                              550.33
                                                                       0.05002
                                                                                   475 50
    1666
           0.01001
                               1.00075
                                          731.15
                                                   0.00100
                                                              550.33
                                                                       0.05004
                                                                                   471.24
           0.01001
                                          723.64
713.35
                                                              550.33
   1667
                      723.64
                               1.00074
                                                   0.00100
                                                                       0.05004
                                                                                   465.47
                                                   0.00100
           0.01000
                      713.35
                               1.00050
                                                              550.33
                                                                        0.05002
                                                                                   458.03
    1668
    1669
           0.01000
                      700.67
                               1.00000
                                          700.67
                                                   0.00100
                                                                        0.05000
                                                                                   449.15
    1672
           0.01000
                      666.39
                               1.00000
                                          666.39
                                                   0.00100
                                                              517.65
                                                                       0.05000
                                                                                   429.74
    1673
           0.01000
                      663.28
                               1.00026
                                          663.28
                                                   0.00100
                                                               519.79
                                                                        0.05001
    1674
           0.01000
                      658.93
                               1.00039
                                          658.93
                                                   0.00100
                                                              521.21
                                                                        0.05002
                                                                                   423.87
    1675
                      653.34
                               1.00039
                                          653.34
                                                   0.00100
                                                                        0.05002
           0.01000
                                                               521.92
                                                                                   419.82
    1676
           0.01000
                      646.20
                               1.00026
                                          646.20
                                                   0.00100
                                                               521.75
                                                                        0.05001
                                                                                   414.85
    1677
           0.01000
                      637.86
                               1.00000
                                          637.86
                                                   0.00100
                                                              520.86
                                                                        0.05000
                                                                                   409.16
    1680
           0.01000
                      582.68
                               1.00000
                                          582.68
                                                   0.00100
                                                               477.93
                                                                        0.05000
    1681
           0.01000
                      578.25
                               1.00000
                                          578.25
                                                   0.00100
                                                               474.34
                                                                       0.05000
                                                                                   370.74
                      574.04
                               1.00000
                                                   0.00100
                                                               470.93
    1682
           0.01000
                                                                        0.05000
                                                               467.70
    1683
           0.01000
                      570.04
                               1.00000
                                          570.04
                                                   0.00100
                                                                       0.05000
                                                                                   365.66
           0.01000
                      566.24
                               1.00000
                                          566.24
                                                   0.00100
                                                              464.64
                                                                       0.05000
    1684
                                                                                   363.33
    1685
           0.01000
                      562.65
                               1.00000
                                          562.65
                                                   0.00100
                                                              461.76
                                                                       0.05000
                    OPTIMIZATION SYSTEM FOR TPSSYM = 24
 TOTAL NUMBER OF DESIGN VARIABLES =
                                     36
 TOTAL NUMBER OF CONSTRAINS = 1196
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1392E+04
  1.0 B
                 В
                                                                                                            В
                                                                                                            Α
                                                                                                                      В
                                     D
                                               D
                                                                                                                      Α
                                                         D
                                                                   D
                                                                             D
                                                                                                            D
  0.0
  -1.0 -
      .08
                  .18
                              .28
                                           .38
                                                       .48 .58 .68
TIME ( X 1.401E-44 )
                                                                                           .78
                                                                                                        .88
                                                                                                                    .98
                                                                                                                              1.08
              MAXIMUM TEMPERATURE OF EVERY LAYER
      1 2 3 4
2300.33 2300.33 550.33 600.33
Tmax:
       1391.98 1391.98 550.28 550.28
Optv:
                  VALUES OF DESIGN VARIABLES :
LAYER
         DEV01
                 DEV02
                          DEV03
                                   DEV04
                                            DEV05
                                                      DEV06
                                                               DEV07
                                                                        DEV08
                                                                                 DEV09
   1 0.07358 0.26541 0.01000 0.02643 0.05898 0.12286 0.01012 0.04929
                                                                               0.07236
               1.00001
                        1.00008
                                  1.12671
                                           1.05599
                                                    1.00000
                                                             1.10190
                                                                      1.07994
    3 0 01911
               0 26115 0 11265 0 03065 0 04353
                                                    0.02286
                                                             0.03678
                                                                      0.02338
                                                                               0 02117
    4 0.05558 0.05000 0.06289 0.07640 0.06274 0.06294 0.05000 0.06700 0.07995
THE ORIGINAL OBJECTIVE FUNCTION =
                                     296.8656311
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.8874019
THE TOTAL OPTIMAL WEIGHT = 4.03060289E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.1126E+01
                                                    A A A
                                                             A AA A AA A AA A AA A AA A AA A A
                                                                                                       A A
                                                                                                                AA A AA A AA
                                                                                                         AAA
                                       AA A AA A A
                                                          ΑА
                                                                                                     AA
            A
                     A AAAA
         AAAA A
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-1.0
      .01
                               .21
                                            .31
                                                                                              .71
                  .11
                                                        .41
                                                                     .51
                                                                                                           .81
                                                                                                                       .91
                                                                                                                                 1.01
                                                              TIME ( X 9.809E-44 )
              OPTIMAL STRUCTURES OF TPS FOR PATCH =
                      (WITH AVERAGE THICKNESS)
HRSI COAT thin skin
                                                                  0.07656 in. 1392.0 F
                                                                 -----
_____
                      LI-900 (P)
                                            slab
                                                                  1.04051 in. 1392.0 F
                                                                  i
                     RTV-560 thin skin
                                                                  0.06348 in. 550.3 F
                      17 LB SIP .16 IN
                                                                  0.06306 in. 550.3 F
_____
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
  PANEL
                               LAYER02
                                                    LAYER03
                     805.44
759.89
                              1.00152
                                                    0.01411
                                                               550.33
550.33
                                                                         0.06602
    795
          0.11343
                                          805.44
                                                                                     465.80
                                          759.89
    796
          0.12068
                                                                                     441.15
          0.12286
                     710.55
                               1.00000
                                          710.55
                                                    0.02286
                                                                550.33
                                                                         0.06294
    797
    798
          0.11807
                     678.74
                              0.99991
                                          678.74
                                                    0.03050
                                                               534.94
                                                                         0.06148
                                                                                     388.43
                     647.87
                                           647.87
                                                    0.04033
                     617.87
589.02
                              0.99979
0.99982
                                          617.87
589.02
    800
          0.09887
                                                    0.05211
                                                               490.73
                                                                         0.06001
                                                                                     326 77
                                                    0.06555
                                                                462.04
                                                                         0.06000
          0.08373
                                                                                     293.11
    801
                                          562.00
537.61
    802
          0.06427
                     562.00
                              0.99991
                                                    0.08036
                                                                429.06
                                                                         0.06049
                                                                                     257 93
    803
          0.03989
                     537.61
                              1.00002
                                                    0.09618
                                                                391.89
                                                                         0.06145
                                                                                     221.57
    804
          0.01000
                     516.87
                              1.00008
                                          516.87
                                                    0.11265
                                                                350.62
                                                                         0.06289
                                                                                    184.38
    805
          0.06826
                     927.57
                               1.02571
                                          927.57
                                                    0.01439
                                                               550.33
                                                                         0.06283
                                                                                     483.01
                      915.54
    806
          0.07831
                               1.01881
                                           915.54
                                                    0.02573
                                                                550.33
                                                                         0.06019
                                                                                     454.54
    807
          0.09124
                     891.75
867.23
                              1.01282
1.00958
                                          891.75
                                                    0.04193
                                                               550.18
                                                                         0.05787
                                                                                     420.54
          0.10469
                                          867.23
                                                    0.06352
                                                                533.45
                                                                         0.05595
    808
                                                                                     383.54
    809
          0.12165
                      831.20
                               1.00664
                                           831.20
                                                    0.09012
                                                                511.94
                                                                         0.05439
                                                                                     341.13
                                                                         0.05319
    810
          0.14184
                      783.80
                               1.00410
                                           783.80
                                                    0.12164
                                                                485.59
                                                                                     293.33
                                                                                     240.21
    811
          0.16488
                     725.27
                               1.00207
                                          725.27
                                                    0.15796
                                                                454.34
                                                                         0.05236
    812
          0 19030
                     656 06
                               1 00065
                                          656 06
                                                    0 19893
                                                               418 09
                                                                         0.05192
                                                                                     181 88
    813
          0.21751
                      576.69
                               0.99994
                                           576.69
                                                    0.24434
                                                                376.79
                                                                         0.05192
    814
          0 24580
                     516.87
                               1.00004
                                          487.92
                                                    0.29391
                                                                330.38
                                                                         0.05238
                                                                                     167 42
          0.03621
                     1041.14
                               1.07234
                                          1041.14
                                                    0.02122
                                                                550.33
                                                                         0.06527
    815
                                                                                     513.09
                                         1023.04
    816
          0 04536
                     1023.04
                               1.06441
                                                    0 02987
                                                                550.33
                                                                         0.06421
                                                                                     493 01
          0.05898
                     999.28
                                                    0.04353
    817
                               1.05597
                                          999.28
                                                                550.32
                                                                         0.06274
                                                                                     467.04
                                                                                     440.57
          0.07470
                     972.90
                               1.05073
                                           972.90
                                                    0.06109
                                                                539.07
                                                                         0.06166
    818
    819
          0.09481
                     937.86
                               1.04433
                                          937.86
                                                    0.08261
                                                               524.72
                                                                         0.06031
                                                                                     409.34
    820
          0.11940
                     894.38
                               1.03683
                                          894.38
                                                    0.10837
                                                                507.09
                                                                         0.05869
                                                                                     372.99
    821
          0 14859
                     842 29
                               1 02841
                                          842 29
                                                    0 13869
                                                                485.93
                                                                         0.05679
                                                                                     331 09
                                                    0.17397
                                                                         0.05466
          0.18255
                     781.05
                               1.01927
                                           781.05
                                                                460.89
    822
                                                                                     283.18
    823
          0.22144
                     709.90
                               1.00969
                                           709.90
                                                    0.21464
                                                                431.60
                                                                         0.05237
                                                                                     228.79
                    627.81
1139.76
    824
          0.26541
                               1.00001
                                          627.81
                                                    0.26115
                                                                397.61
                                                                         0.05000
                                                                                     167.42
          0.01839
                                          1139.76
                                                    0.03315
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                                                                         0.07167
    826
          0.02210
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                                                                550.33
                                                                         0.07464
                                                                                     550.19
    827
          0.02643
                     1044.64
                               1.12671
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                                                    0.03065
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                                                                         0.07640
                                                                                     550.28
    828
          0.03132
                     1008.08
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                                                                550.33
                                                                         0.06741
    833
          0.06500
                     928 11
                               1 02859
                                          928 11
                                                    0.02104
                                                                550 33
                                                                         0.06208
                                                                                     534 87
    834
          0.07358
                      932.69
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                                                    0.01911
                                                                550.33
                                                                         0.05558
                                                                                     529.64
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628.17
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397.79
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0.05000
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                                                                                     529.64
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627.81
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                                                    0 01911
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397.61
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                                                                397.61
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                                                                                     167.42
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918
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                                                       0.26115
                                                                   397.61
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                                                                                        167.42
     920
           0 26541
                       627 81
                                 1 00001
                                             627.81
                                                       0 26115
                                                                   397 61
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                                                                                        167 42
                       932.69
                                             932.69
     924
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                                                       0.01911
                                                                   550.33
                                                                            0.05558
                                                                                        529.64
     925
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                                                       0.21153
                                                                   433.70
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                                                                                        248.65
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                                                                   397.61
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627.81
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                                                                   397.61
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                                 1.12928
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                                                                            0.06545
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                                                                   550.33
                                                                            0 07479
                                                                                        518 66
                       895.10
                                 1.04498
                                             895.10
                                                       0.00898
                                                                   550.33
                                                                            0.07116
                                                                                        529.63
    1331
           0.06126
    1332
           0.03380
                      1061.19
                                 1.08445
                                            1061.19
                                                       0.01861
                                                                   550.33
                                                                            0.06510
                                                                                        538.15
    1333
           0.01178
                      1302.24
                                 1.11654
                                            1302.24
                                                       0.03578
                                                                   550.33
                                                                            0.05861
                                                                                        543.52
                                                                   550.33
    1337
            0.08180
                                 1.00687
                                             909.18
                                                       0.01649
    1338
           0.06398
                       874.32
                                 1.04919
                                             874.32
                                                       0.01291
                                                                   550.33
                                                                            0.07344
                                                                                        534.56
                      1053.86
    1339
           0.03804
                                 1.08473
                                            1053.86
                                                       0.02131
                                                                   550.33
                                                                            0.06476
                                                                                        539.04
    1340
           0.01084
                      1345.85
                                 1.10984
                                            1345.85
                                                       0.03629
                                                                   550.33
                                                                            0.05452
                                                                                        541.48
           0.07236
                                 1.00000
                                                       0.02117
                                                                   550.33
                                                                            0.07995
    1344
                       963.89
                                             963.89
                                                                                        535.59
    1345
           0.07001
                       844.01
                                 1.04691
                                             844.01
                                                       0.01811
                                                                   550.33
                                                                            0.07693
    1346
           0.04929
                       989.29
                                 1.07994
                                             989.29
                                                       0.02338
                                                                   550.33
                                                                            0.06700
                                                                                        538.33
           0.01012
                      1391.98
                                 1.10190
                                            1391.98
                                                       0.03678
                                                                   550.33
                                                                            0.05000
                     OPTIMIZATION SYSTEM FOR TPSSYM =
                                                            25
 TOTAL NUMBER OF DESIGN VARIABLES =
                                        36
 TOTAL NUMBER OF CONSTRAINS
                                       996
 TOTAL NUMBER OF TEMP. CONSTRAINS = TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
    Х
       0.9353E+03
   1.0 B
                                                  В
                                                             В
                                                                        В
                  D
                            D
                                                                                              В
                                                                                                                   В
                                                                                                                              В
                                       D
                                                  D
                                                                                                                   Α
                                                             D
                                                                        D
                                                                                             D
                                                                                                                              Α
                                                                                                        D
                                                                                                                   D
                                                                                                                              D
  -1.0
       .08
                    .18
                                 .28
                                              .38
                                                                        .58
                                                                                                  .78
                                                                                                               .88
                                                                                                                            .98
                                                                                                                                       1.08
                                                           .48
                                                                                     .68
                                                                 TIME ( X 1.401E-44 )
                MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:
        2300.33 2300.33
                             550.33
                                      600 33
Tmax:
Optv:
         935.32
                  935.32
                            550.25
                                      550.45
                     VALUES OF DESIGN VARIABLES :
                   DEV02
                            DEV03
                                      DEV04
                                                DEV05
                                                          DEV06
                                                                   DEV07
                                                                             DEV08
       0.01000
                 0.01000
                          0.01000
                                    0.01000
                                              0.01000
                                                        0.01000
                                                                 0.01000
                                                                           0.01000
                                                                                     0.01000
                          1.00000
                                              1.00000
                                                        1.00000
       1.00000
                 1.00000
                                    1.00000
                                                                  1.00000
                                                                           1.00000
                                                                                     1.00000
       0.04250
                 0.04251
                           0.04257
                                    0.06100
                                              0.06097
                                                        0.06098
                                                                 0.02060
                                                                           0.01733
                                                                                     0.01300
```

THE TOTAL OPTIMAL WEIGHT = 1.55442568E+04

0.05000

THE ORIGINAL OBJECTIVE FUNCTION =

0.05000

0.05000

THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4192527

0.05000

0.05000

222.6508484

0.05000

0.05000

0.05000

0.05000

```
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.8206E+00
  1.0
                     Α
                             Α
                                      Α
                                                                                     Α
                                                                                                             Α
  0.0
                           .27 .37 .47 .57 .o,
TIME ( X 2.803E-44 )
 -1.0
                                                                                                                 .97
      .07
                 .17
                                                                                         .77
                                                                                                     .87
                                                                                                                           1.07
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
(WITH AVERAGE THICKNESS)
                    HRSI COAT thin skin
                                                               0.01000 in. 935.3 F
-----
                                                               ----
                     LI-900 (P)
                                                               1.00000 in. 935.3 F
                                          slab
                                                               i
-----
                    RTV-560 thin skin
   _____
                      17 LB SIP .16 IN
                                        slab
                                                               0.05000 in. 550.5 F
_____
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                              LAYER02
  PANEL
          LAYER01
                                                  LAYER03
                                                                     LAYER04
                                         683 27
                                                             459 74
                                                                                 323 72
    765
          0.01000
                     683 27
                             1.00001
                                                  0.05169
                                                                     0.05000
                                                             435.54
          0.01000
                     629.03
                             1.00001
                                         629.03
                                                  0.05709
                                                                     0.05000
                                                                                 281.31
    766
                     579.29
541.05
                             1.00000
                                         579.29
541.05
                                                  0.06098
0.06324
                                                             412.64
395.19
                                                                     0.05000
    767
          0.01000
                                                                                 245.98
    768
          0.01000
                                                                                 220.00
    769
          0.01000
                     508.76
                             1.00000
                                         508.76
                                                  0.06386
                                                             379.28
                                                                      0.05000
                                                                                 209 23
    770
          0.01000
                     482.42
                             1.00000
                                         482.42
                                                  0.06286
                                                             364.92
                                                                     0.05000
                                                                                 209.23
    771
          0.01000
                     462.04
                             1.00000
                                         462.04
                                                  0.06023
                                                             352.10
                                                                      0.05000
                                                                                 209.23
    772
          0.01000
                     447.60
                             1.00000
                                         447.60
                                                  0.05597
                                                             340.82
                                                                     0.05000
                                                                                 209.23
    773
          0.01000
                     439.11
                             1.00000
                                         439.11
                                                  0.05008
                                                             331.09
                                                                      0.05000
                                                                                 209.23
    774
          0.01000
                     436.58
                             1.00000
                                         436.58
                                                  0 04257
                                                             322.90
                                                                     0.05000
                                                                                 209 23
    775
          0.01000
                     724.22
                              1.00002
                                         724.22
                                                  0.05256
                                                             489.89
                                                                      0.05000
                                                                                 340.62
    776
          0.01000
                     676.19
                              1.00002
                                         676.19
                                                  0.05749
                                                             469.14
                                                                      0.05000
                                                                                 299.81
    777
                     631.10
                                                  0.06097
                                                                     0.05000
          0.01000
                              1.00003
                                         631.10
                                                             448.15
                                                                                 265.21
    778
          0.01000
                     595.60
                              1.00003
                                         595.60
                                                  0.06292
                                                                      0.05000
    779
          0.01000
                     563.69
                              1.00002
                                         563.69
                                                  0.06335
                                                             415.22
                                                                      0.05000
                                                                                 220.17
    780
                     535.36
                                         535.36
          0.01000
                              1.00002
                                                  0.06224
                                                             399.22
                                                                      0.05000
    781
          0.01000
                     510.59
                              1.00002
                                         510.59
                                                  0.05960
                                                             383.50
                                                                     0.05000
                                                                                 209.23
    782
                              1.00001
                                                  0.05543
          0.01000
                                                                      0.05000
                     489.31
                                         489.31
                                                             368.02
                                                                                 209.23
    783
          0.01000
                     471.44
                              1.00001
                                         471.44
                                                  0.04974
                                                             352.74
                                                                      0.05000
                                                                                 209.23
    784
          0.01000
                     456.88
                              1.00000
                                         456.88
                                                  0.04251
                                                             337.57
                                                                     0.05000
                                                                                 218.26
    785
          0.01000
                     770.07
                              1.00000
                                         770.07
                                                  0.05315
                                                             519.58
                                                                      0.05000
    786
          0.01000
                     733 09
                              1 00000
                                         733 09
                                                  0.05781
                                                             507 92
                                                                     0.05000
                                                                                 322 03
                     697.50
    787
          0.01000
                              1.00000
                                         697.50
                                                  0.06100
                                                             494.70
                                                                      0.05000
                                                                                 291.90
    788
789
                     663.64
631.11
                              1.00000
                                                  0.06270
0.06295
                                                             480.10
463.97
                                                                     0.05000
0.05000
          0.01000
                                         663.64
                                                                                 267.45
          0.01000
                                         631.11
                                                                                 248.33
    790
          0.01000
                     599.93
                              1.00000
                                         599.93
                                                  0.06175
                                                             446.33
                                                                      0.05000
                                                                                 234.53
    791
          0.01000
                     570.09
                              1.00000
                                         570.09
                                                  0.05911
                                                             427.17
                                                                      0.05000
                                                                                 226.05
    792
          0.01000
                     541.60
                              1.00000
                                         541.60
                                                  0.05502
                                                                      0.05000
                                                                                 222.90
                     514.44
488.61
    793
          0.01000
                              1.00000
                                         514.44
                                                  0.04948
                                                             384.31
                                                                      0.05000
                                                                                 225.07
    794
          0.01000
                              1.00000
                                         488.61
                                                  0.04250
                                                             360.59
                                                                      0.05000
                                                                                 232.57
    879
          0.01000
                     488.61
                              1.00000
                                         488.61
                                                  0.04250
                                                             360.59
                                                                      0.05000
                                                                                 232.57
    880
          0.01000
                     457.68
                              1.00000
                                         457.68
                                                  0.04251
                                                             338.15
                                                                      0.05000
                                                                                 218.62
    881
          0.01000
                     436.99
                              1.00000
                                         436.99
                                                  0.04257
                                                             323.20
                                                                      0.05000
                                                                                 209.41
    886
          0.01000
                     488.61
                              1.00000
                                         488.61
                                                  0.04250
                                                             360.59
                                                                     0.05000
                                                                                 232.57
    887
                     459.30
                              1.00000
                                         459.30
                                                  0.04251
                                                             339.32
                                                                      0.05000
    888
          0.01000
                     456.88
                              1 00000
                                         456.88
                                                  0.04251
                                                             337 57
                                                                      0.05000
                                                                                 218 26
                     488.61
                              1.00000
                                         488.61
                                                  0.04250
                                                             360.59
                                                                      0.05000
    893
          0.01000
                                                                                 232.57
                     461.20
456.88
                             1.00000
                                         461.20
456.88
                                                             340.70
337.57
    894
          0.01000
                                                  0.04251
                                                                     0.05000
                                                                                 220.20
                                                  0.04251
          0.01000
                                                                      0.05000
                                                                                 218.26
    895
    900
          0.01000
                     488.61
                              1.00000
                                         488.61
                                                  0.04250
                                                             360.59
                                                                      0.05000
                                                                                 232.57
                              1.00000
                                                             342.49
337.57
    901
          0.01000
                     463.67
                                         463.67
                                                  0.04251
                                                                      0.05000
                                                                                 221.31
                     456.88
                                         456.88
                                                  0.04251
    902
          0.01000
                                                                      0.05000
                                                                                 218.26
    907
          0.01000
                     488.61
                              1.00000
                                         488.61
                                                  0.04250
                                                             360.59
                                                                      0.05000
                                                                                 232.57
    908
                              1.00000
                                         466.82
                                                  0.04250
                                                             344.77
                                                                      0.05000
          0.01000
                     466.82
                                                                                 222.73
    909
          0.01000
                     456.88
                              1.00000
                                         456.88
                                                  0.04251
                                                             337.57
                                                                      0.05000
                                                                                 218.26
    914
          0.01000
                              1.00000
                                         488.61
                                                  0.04250
                                                             360.59
                                                                      0.05000
                     488.61
                                                                                 232.57
                              1.00000
                                         466.69
                                                  0.04251
                                                                      0.05000
    916
          0.01000
                     456.88
                             1.00000
                                         456.88
                                                  0.04251
                                                             337.57
                                                                      0.05000
                                                                                218.26
```

```
921
           0.01000
                       488.61
                                 1.00000
                                             488.61
                                                      0.04250
                                                                  360.59
                                                                            0.05000
                                                                                        232.57
     922
           0.01000
                       463.84
                                 1.00000
                                             463.84
                                                      0.04251
                                                                  342.61
                                                                            0.05000
                                                                                        221.39
     923
           0.01000
                       456.88
                                 1 00000
                                             456.88
                                                      0.04251
                                                                  337 57
                                                                            0.05000
                                                                                        218 26
                                                       0.04250
     928
           0.01000
                       488.61
                                 1.00000
                                             488.61
                                                                   360.59
                                                                            0.05000
                                                                                        232.57
                       462.71
                                 1.00000
                                                                  341.80
337.57
     929
           0.01000
                                             462.71
                                                       0.04251
                                                                            0.05000
                                                                                        220.88
                                                      0.04251
           0.01000
                                                                                        218.26
     930
                       456.88
                                 1.00000
                                             456.88
                                                                            0.05000
     935
           0.01000
                       488.61
                                 1.00000
                                             488.61
                                                       0.04250
                                                                   360.59
                                                                            0.05000
     936
           0.01000
                       463.41
                                 1.00000
                                             463.41
                                                       0.04251
                                                                  342.30
                                                                            0.05000
                                                                                        221.19
     937
           0.01000
                                 1.00000
                                             456.88
                                                       0.04251
                                                                   337.57
                                                                            0.05000
                                                      0.04612
0.04745
    1306
           0.01000
                       728.66
                                 1.00001
                                             728.66
                                                                   478.73
                                                                            0.05000
                                                                                        362.67
                                                                                        377.90
                                 1.00002
                                                                            0.05000
    1307
           0.01000
                       763.90
                                             763.90
                                                                   505.33
    1308
           0.01000
                       801.39
                                 1.00000
                                             801.39
                                                       0.04822
                                                                   527.99
                                                                            0.05000
                                                                                        390.84
    1313
           0.01000
                       763.99
                                 1.00001
                                             763.99
                                                      0.04099
                                                                   492.13
                                                                            0.05000
                                                                                        394.98
                                             793.36
           0.01000
                       793.36
                                 1.00001
                                                                   533.74
                       826.10
801.25
    1315
           0.01000
                                 1.00000
                                             826.10
                                                      0.04375
                                                                            0.05000
                                                                                        418.88
    1320
                                 1.00001
                                             801.25
                                                       0.03519
                                                                   505.77
                                                                            0.05000
           0.01000
                                                                  524.43
538.79
    1321
           0.01000
                       822.28
                                 1.00001
                                             822.28
                                                      0.03755
                                                                            0.05000
                                                                                        440.69
           0.01000
                       850.91
                                 1.00000
                                             850.91
                                                      0.03879
                                                                            0.05000
    1322
                                                                                        448.53
    1327
           0.01000
                       841.02
                                 1.00000
                                             841.02
                                                       0.02869
                                                                   519.84
                                                                            0.05000
                                                                                        467.03
    1328
           0.01000
                       851.23
                                 1.00001
                                             851.23
                                                      0.03170
                                                                  532.80
                                                                            0.05000
                                                                                        474.72
           0.01000
                                 1.00000
    1334
           0.01000
                       884.29
                                 1.00000
                                             884.29
                                                      0.02143
                                                                  534.80
                                                                            0.05000
                                                                                        507.32
    1335
           0.01000
                                 1.00000
                                             881.61
                                                       0.02509
                                                                   541.32
                                                                            0.05000
    1336
           0.01000
                       901.89
                                 1 00000
                                             901.89
                                                      0.02723
                                                                  547.07
                                                                            0.05000
                                                                                        513.81
    1341
           0.01000
                       935.32
                                 1.00000
                                             935.32
                                                      0.01300
                                                                  550.33
                                                                            0.05000
                                                                                        548.72
           0.01000
                       913.52
                                 1.00000
                                             913.52
                                                       0.01733
                                                                   550.33
                                                                            0.05000
    1343
           0.01000
                       928.15
                                 1.00000
                                             928.15
                                                      0.02060
                                                                   550.33
                                                                            0.05000
                                                                                        549.54
                     OPTIMIZATION SYSTEM FOR TPSSYM =
TOTAL NUMBER OF DESIGN VARIABLES =
                                       36
 TOTAL NUMBER OF CONSTRAINS
                                    = 1228
 TOTAL NUMBER OF CONSTRAINS = 1226
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.9040E+03
1.0 B
                  В
                            В
                                       В
                  D
                            D
                                                                        В
                                                                                             В
                                                                                                                   В
                                                                                                                              В
                                                                        D
                                                                                                                              Α
                                                                                                        D
                                                                                                                              D
   0.0
  -1.0 -
                    .18
                                .28
                                              .38
                                                           .48
                                                                        .58
                                                                                                  .78
                                                                                                               .88
                                                                                                                            .98
                                                                                                                                      1.08
                                                                 TIME ( X 1.401E-44 )
               MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:
       1 2 3 4
2300.33 2300.33 550.33 600.33
Tmax:
         903.96
                   903.96
                           545.54
                                     545.54
Optv:
                     VALUES OF DESIGN VARIABLES :
LAYER
         DEV01
                   DEV02
                            DEV03
                                     DEV04
                                               DEV05
                          0.01000
                                   0.01000
                                             0.01000 0.01000
       0.01000
                0.01000
                                                                0.01000 0.01000
                                                                                    0.01000
       1.00000
                 1.00000
                          1.00000
                                    1.00000
                                              1.00000
                                                        1.00000
                                                                 1.00000
                                                                           1.00000
                                                                                     1.00000
       0.00100
                 0.00100
                          0.00100
                                    0.00100
                                              0.00100
                                                        0.00100
                                                                 0.00100
                                                                           0.00100
                                                                                     0.00100
      0.05000
                 0.05000
                          0.05000
                                    0.05000
                                             0.05000
                                                        0.05000
                                                                 0.05000
                                                                           0.05000
                                                                                     0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                         308.7772827
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.3081630
THE TOTAL OPTIMAL WEIGHT = 1.59605106E+04
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.5763E+01
1.0 +
```

```
0.0
 -1.0
                 .18
      . 0.8
                                           . 38
                                                                                            . 78
                              . 28
                                                       .48
                                                                    . 58
                                                                                                         . 88
                                                                                                                     . 98
                                                                                                                               1.08
                                                             TIME ( X 1.401E-44 )
             OPTIMAL STRUCTURES OF TPS FOR PATCH =
                    (WITH AVERAGE THICKNESS)
______
                      HRSI COAT
                                                                0.01000 in.
                                                                               904.0 F
                                                                ----
                      LI-900 (P)
                                           slab
                                                                1 00007 in
                                                                              904 0 F
                                                                i
_____
                                                                0.00100 in. 545.5 F
                     RTV-560
                                        thin skin
-----
                      17 LB SIP .16 IN
                                                                0.05000 in.
-----
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
 PANEL
  1918
          0.01000
                     686.12
                              1.00000
                                          686.12
                                                   0.00100
                                                              550.33
                                                                       0.05000
                                                                                   444.39
                                                   0.00100
   1394
          0.01000
                     336.50
                              1.00000
                                          336.50
                                                              273.86
                                                                       0.05000
                                                                                   211.23
   1395
          0.01000
                     356.35
                              1.00000
                                          356.35
                                                   0.00100
                                                              289.53
                                                                       0.05000
                                                                                   222.86
   1396
          0.01000
                     383.16
                              1.00000
                                          383.16
                                                   0.00100
                                                              311.29
                                                                       0.05000
                                                                                   239.77
                     416.85
                              1.00000
                                                   0.00100
   1397
          0.01000
                                          416.85
                                                               339.06
                                                                       0.05000
                                                                                   261.89
   1402
          0.01000
                     366.75
                              1.00000
                                          366.75
                                                   0.00100
                                                              299.28
                                                                       0.05000
                                                                                   231.30
   1403
          0.01000
                     384.68
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427.36
   1443
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                              1.00066
                                          512.82
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                                                                                   327.93
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   1444
                                                                       0.05003
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          0.01001
                     543 43
                              1 00063
                                          543 43
                                                   0 00100
                                                              445 57
                                                                       0.05003
                                                                                   348 14
   1453
          0.01000
                     554.70
                              1.00000
                                          554.70
                                                   0.00100
                                                               454.39
                                                                       0.05000
                              1.00000
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558.65
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0.00100
                                                              458.17
459.52
                                                                       0.05000
0.05003
                                                                                   359.08
359.63
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          0.01001
                     558.65
   1460
          0.01001
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                                                   0.00100
                                                               463.87
                                                                       0.05003
                                                                                   366.81
   1461
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                                             617.31
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                                                                   505 88
                                                                            0.05000
                                                                                         398 54
                                             693.47
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                       693.47
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                                                                   500.19
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                                                                                         261 89
    1575
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                                                                   312.14
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                                                                                         239.77
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                                                                   273.86
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    1583
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                                                                   550.33
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                                                                                         435.95
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                       672.91
                                 1.00000
                                             672.91
                                                       0.00100
                                                                            0.05000
    1921
                                                                   550.33
                                                                                        435.95
                     OPTIMIZATION SYSTEM FOR TPSSYM =
TOTAL NUMBER OF DESIGN VARIABLES =
                                       36
 TOTAL NUMBER OF CONSTRAINS = 1228
TOTAL NUMBER OF TEMP. CONSTRAINS = 468
 TOTAL NUMBER OF TEMP. PRINTOUTS =
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   Х
        0.6572E+03
                                       В
                                                  В
                                                                        В
                                                                                              В
                  D
                                       D
                                                                                                                              В
                             D
                                                                                              Α
                                                  D
                                                             D
                                                                                   D
                                                                                                        D
                                                                                                                    D
                                                                                                                              D
   0.0
  -1.0 +
                                                                  TIME ( X 1.401E-44 )
                MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER:
                        2
        2300.33 2300.33
                            550.33
                                      600.33
Tmax:
Optv:
         657.20
                   657.20
                             427.54
                                      427.98
                     VALUES OF DESIGN VARIABLES :
       DEV01 DEV02 DEV03 DEV04
0.01000 0.01000 0.01000 0.01000
                                                          DEV06
                                                DEV05
                                                                    DEV07
```

0.01000

1.00000

0.00100

0.01000

0.00100

0.01000

0.00100

0.01000

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0.01000

1.00000

0.00100

LAYER

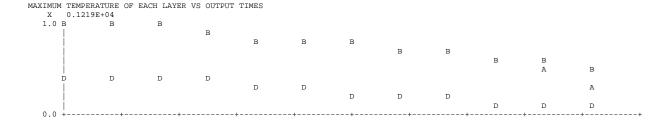
0.00100

```
4 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
 THE ORIGINAL OBJECTIVE FUNCTION =
                                      308 7394409
 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.3081630
 THE TOTAL OPTIMAL WEIGHT = 1.62614041E+04
 OBJECTIVE FUNCTION VS ITERATIONS :
          1 0.3081630
2 0.3081630
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
   X 0.3082E+00
   1.0 A
   0.0
  -1.0 +
                                                       1.40 1.50 ....
TIME ( X 0.000E+00 )
                                           1.30
      1.00
                  1.10
                               1.20
                                                                                1.60
                                                                                            1.70
                                                                                                         1.80
                                                                                                                     1.90
                                                                                                                                2.00
              OPTIMAL STRUCTURES OF TPS FOR PATCH =
                      (WITH AVERAGE THICKNESS)
 - --,
                      HRSI COAT
                                                                 0.01000 in. 657.2 F
                                            thin skin
 -----
                       LI-900 (P)
                                                                 1.00000 in. 657.2 F
                                                                   i
                      RTV-560
                                            thin skin
                                                                 0.00100 in. 427.5 F
 -----
                                                                 ----
                                                                 0.05000 in. 428.0 F
                       17 LB SIP .16 IN
                                            slab
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
   PANEL
                               LAYER02
          LAYER01
                                                    LAYER03
                                                                        LAYER04
   1932
           0.01000
                               1.00000
                                           656.55
                                                    0.00100
                                                               541.81
                                                                                    427.51
    1390
           0.01000
                      297.20
301.01
                               1.00000
                                           297.20
301.01
                                                    0.00100
                                                               243.42
246.41
                                                                        0.05000
                                                                                    189.64
                                                    0.00100
                                                                                    191.98
    1391
           0.01000
                               1.00000
                                                                         0.05000
                               1.00000
                                           308.10
318.58
                                                    0.00100
                                                               251.87
259.90
    1392
           0.01000
                      308.10
                                                                         0.05000
                                                                                    195.82
                                                                         0.05000
           0.01000
    1393
                      318.58
                                                                                    201.21
    1398
           0.01000
                      333.29
                               1.00000
                                           333.29
                                                    0.00100
                                                               272.72
                                                                         0.05000
    1399
           0.01000
                      337.99
                               0.99999
                                           337.99
                                                    0.00100
                                                               276.51
                                                                         0.05000
                                                                                    215.28
    1400
           0.01000
                      344.57
                               0.99999
                                           344.57
                                                    0.00100
                                                               281.71
                                                                         0.05000
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           0.01000
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                                           353 23
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                                                               288 43
                                                                         0.05000
                                                                                    223 71
    1406
           0.01000
                      368.00
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                                           368.00
                                                    0.00100
                                                               300.99
                                                                         0.05000
                                                                                    234.18
   1407
1408
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0.01000
                      373.30
379.44
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0.99998
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379.44
                                                    0.00100
0.00100
                                                               305.33
310.27
                                                                        0.05000
0.05000
                                                                                    237.66
                                                                                    241.39
    1409
           0.01000
                      386.45
                               1.00000
                                           386.45
                                                    0.00100
                                                               315.82
                                                                         0.05000
                      401.33
406.96
    1414
           0.01000
                               1.00000
                                           401.33
                                                    0.00100
                                                               328.22
                                                                         0.05000
                                                                                    255.40
    1415
           0.01000
                               0.99998
                                           406.96
                                                    0.00100
                                                               332.87
                                                                         0.05000
                      412.65
418.22
                                           412.65
418.22
    1416
           0.01000
                               0.99998
                                                    0.00100
                                                               337.54
                                                                         0.05000
                                                                                    262.76
    1417
           0.01000
                               1.00000
                                                    0.00100
                                                                342.05
                                                                         0.05000
                                                                                    266.09
    1422
           0.01000
                      433.28
                               1.00000
                                           433.28
                                                    0.00100
                                                               354.42
                                                                         0.05000
                                                                                    275.91
    1423
           0.01000
                      438.99
                               0.99997
                                           438.99
                                                    0.00100
                                                               359.16
                                                                         0.05000
                                                                                    279.72
    1424
           0.01000
                      444.20
                               0.99997
                                           444.20
                                                    0.00100
                                                                363.50
                                                                         0.05000
                                                                                    283.17
    1425
           0.01000
                      448.53
                               1.00000
                                           448.53
                                                    0.00100
                                                               367.12
                                                                         0.05000
                                                                                    285.98
    1430
           0.01000
                      463.84
                                           463.84
                                                    0.00100
                                                                         0.05000
    1431
           0.01000
                      469.39
                               0 99997
                                           469.39
                                                    0.00100
                                                               384.20
                                                                         0.05000
                                                                                    299 43
                      474.07
                               0.99997
                                           474.07
                                                    0.00100
                                                               388.14
                                                                         0.05000
    1432
           0.01000
                                                                                    302.62
                      477.38
493.03
                               1.00000
                                           477.38
493.03
                                                    0.00100
0.00100
                                                               391.02
403.71
                                                                        0.05000
    1433
           0.01000
                                                                                    304.98
    1438
           0.01000
                                                                                    314.85
    1439
           0.01000
                      498.16
                               0.99997
                                           498.16
                                                    0.00100
                                                               407.98
                                                                         0.05000
                      502.24
504.76
                                           502.24
504.76
                                                               411.46
413.75
    1440
           0.01000
                               0.99997
                                                    0.00100
                                                                         0.05000
                                                                                    321.11
    1441
                               1.00000
                                                    0.00100
                                                                         0.05000
           0.01000
                                                                                    323.10
                      520.83
525.27
                                           520.83
525.27
    1446
           0.01000
                               1.00000
                                                    0.00100
                                                               426.80
430.49
                                                                         0.05000
                                                                                    333.26
                                                    0.00100
                                                                         0.05000
    1447
           0.01000
                               0.99997
                                                                                    336.19
    1448
           0.01000
                      528.68
                               0.99997
                                           528.68
                                                    0.00100
                                                                433.43
                                                                         0.05000
                                                                                    338.63
                                          530.68
547.26
                               1.00000
           0.01000
                                                    0.00100
                                                                         0.05000
    1449
                      530.68
                                                               435.31
                                                                                    340.35
                                1.00000
                      550.73
    1455
           0.01000
                               0.99997
                                           550.73
                                                    0.00100
                                                               451.73
                                                                        0.05000
                                                                                    353.23
```

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1456
       0.01000
                             0.99997
                                          553.46
                                                    0.00100
                                                                454.10
                                                                          0.05000
                                                                                      355.21
                    553.46
1457
       0.01000
                    555.18
                              1.00000
                                          555.18
                                                    0.00100
                                                                455.75
                                                                          0.05000
                                                                                      356.75
1462
       0.01000
                    572.30
                              1 00000
                                          572 30
                                                    0 00100
                                                                469 89
                                                                          0.05000
                                                                                      368 00
                                                                471.62
1463
       0.01000
                    574.43
                              0.99997
                                          574.43
                                                    0.00100
                                                                          0.05000
                                                                                      369.29
1464
       0.01000
                    576.49
                              0.99997
                                          576.49
                                                    0.00100
                                                                473.41
                                                                          0.05000
                                                                                      370.79
                                                                475.01
       0.01000
                    578.20
                              1.00000
                                          578.20
                                                    0.00100
                                                                          0.05000
                                                                                      372.26
1465
1474
        0.01000
                    654.43
                              1.00000
                                          654.43
                                                    0.00100
                                                                          0.05000
                                                                                      424.67
                                                                539.32
1475
       0.01000
                    649.55
                              1.00000
                                          649.55
                                                    0.00100
                                                                535.48
                                                                          0.05000
                                                                                      421.85
1476
        0.01000
                    650.23
                              1.00000
                                          650.23
                                                    0.00100
                                                                          0.05000
                                                                                      422.79
                                                                536.29
1477
       0.01000
                    657.20
                              1.00000
                                          657.20
                                                    0.00100
                                                                542.37
                                                                          0.05000
                                                                                      427.98
                                                                                      417.49
                    644.17
                              1.00000
1482
       0.01000
                                          644.17
                                                    0.00100
                                                                530.59
                                                                          0.05000
                                                                527.56
527.29
                                                                                      415.17
1483
        0.01000
                    640.39
                              0.99999
                                          640.39
                                                    0.00100
                                                                          0.05000
1484
       0.01000
                    639.88
                              0.99999
                                          639.88
                                                    0.00100
                                                                          0.05000
                                                                                      415.16
                              1.00000
                                                    0.00100
1485
        0.01000
                    644.66
                                          644.66
                                                                531.51
                                                                          0.05000
1490
       0.01000
                    633.16
                              1.00000
                                          633.16
                                                    0.00100
                                                                521.26
                                                                          0.05000
                                                                                      409.83
                    629.99
                                          629.99
                                                                                      407.78
1491
        0.01000
                              0.99999
                                                    0.00100
                                                                518.65
                                                                          0.05000
1492
       0.01000
                    629.20
                              0.99999
                                          629.20
                                                    0.00100
                                                                518.10
                                                                          0.05000
                                                                                      407.46
                                          632.30
                                                    0.00100
                                                                          0.05000
                                                                                      409.91
1493
       0.01000
                    632.30
                              1.00000
                                                                520.86
1498
        0.01000
                    621.33
                              1.00000
                                          621.33
                                                    0.00100
                                                                511.26
                                                                          0.05000
                                                                                      401.66
1499
       0.01000
                    618.68
                              0.99999
                                          618.68
                                                    0.00100
                                                                509.03
                                                                          0.05000
                                                                                      399.85
                              0.99998
                                                    0.00100
1500
        0.01000
                                                                508.25
                                                                          0.05000
                                                                                       399.28
1501
       0.01000
                    619.33
                              1.00000
                                          619.33
                                                    0.00100
                                                                509.76
                                                                          0.05000
                                                                                      400.68
1506
       0.01000
                    608.89
                              1.00000
                                          608.89
                                                    0.00100
                                                                500.77
                                                                          0.05000
                                                                                      393.13
1507
       0.01000
                    606.67
                              0 99998
                                          606.67
                                                    0 00100
                                                                498 85
                                                                          0.05000
                                                                                      391 49
1508
                    605.43
                              0.99998
                                          605.43
                                                    0.00100
                                                                497.81
                                                                          0.05000
                                                                                      390.67
       0.01000
1509
        0.01000
                    605.78
                              1.00000
                                          605.78
                                                    0.00100
                                                                498.21
                                                                          0.05000
                                                                                      391.15
1514
       0.01000
                    595.88
                              1.00000
                                          595.88
                                                    0.00100
                                                                489.84
                                                                          0.05000
                                                                                      384.25
                    593.97
                                          593.97
1515
        0.01000
                              0.99998
                                                    0.00100
                                                                488.12
                                                                          0.05000
1516
       0.01000
                    592.40
                              0.99997
                                          592.40
                                                    0.00100
                                                                486.77
                                                                          0.05000
                                                                                      381.62
1517
        0.01000
                    591.62
                              1.00000
                                          591.62
                                                    0.00100
                                                                486.19
                                                                          0.05000
                                                                                      381.29
1522
       0.01000
                    318.58
                              1.00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
                                                                                      201.21
1523
                              1.00000
                                                    0.00100
                                                                252.06
                                                                          0.05000
       0.01000
                    308.35
                                          308.35
                                                                                      195.95
        0.01000
                              1.00000
                                          301.25
                                                    0.00100
                                                                246.59
                                                                          0.05000
1524
                    301.25
                                                                                      192.12
1525
       0.01000
                    297.22
                              1,00000
                                          297.22
                                                    0.00100
                                                                243.43
                                                                          0.05000
                                                                                      189.65
1530
        0.01000
                    318.58
                              1.00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
1531
       0.01000
                    308 58
                              1 00000
                                          308.58
                                                    0 00100
                                                                252.24
                                                                          0.05000
                                                                                      196 08
                                                                246.77
1532
       0.01000
                    301.48
                              1.00000
                                          301.48
                                                    0.00100
                                                                          0.05000
                                                                                      192.25
1533
       0.01000
                    297.24
                              1 00000
                                          297 24
                                                    0.00100
                                                                243.45
                                                                          0.05000
                                                                                      189 67
       0.01000
                    318.58
                              1.00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
1538
                                                                                      201.21
1539
       0.01000
                    308.75
                              1.00000
                                          308.75
                                                    0.00100
                                                                252.37
                                                                          0.05000
                                                                                      196.17
1540
       0.01000
                    301.61
                              1.00000
                                          301.61
                                                    0.00100
                                                                246.87
                                                                          0.05000
                                                                                      192.32
                                          297.25
                    297.25
1541
        0.01000
                              1.00000
                                                    0.00100
                                                                243.46
                                                                          0.05000
                                                                                      189.68
1546
       0.01000
                    318.58
                              1.00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
                                                                                      201.21
1547
                    308.77
                              1.00000
                                          308.77
                                                    0.00100
                                                                252.39
                                                                          0.05000
       0.01000
                                                                                      196.18
1548
       0.01000
                    301.58
                              1.00000
                                          301.58
                                                    0.00100
                                                                246.85
                                                                          0.05000
                                                                                      192.31
                              1.00000
                                                    0.00100
                                                                243.46
                                                                          0.05000
1549
       0.01000
                    297.25
                                          297.25
                                                                                      189.68
1554
        0.01000
                    318.58
                              1.00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
                                                                                      201.21
1555
       0.01000
                    308 74
                              1 00000
                                          308 74
                                                    0 00100
                                                                252 36
                                                                          0.05000
                                                                                      196 16
1556
       0.01000
                    301.44
                              1.00000
                                          301.44
                                                    0.00100
                                                                246.74
                                                                          0.05000
                                                                                      192.22
1557
       0.01000
                    297.24
                              1 00000
                                          297.24
                                                    0.00100
                                                                243.45
                                                                          0.05000
                                                                                      189 67
1562
       0.01000
                    318.58
                              1.00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
                                                                                      201.21
1563
       0 01000
                    308.57
                              1 00000
                                          308.57
                                                    0 00100
                                                                252 23
                                                                          0.05000
                                                                                      196 07
                              1.00000
                                                    0.00100
1564
       0.01000
                    301.32
                                          301.32
                                                                246.65
                                                                          0.05000
                                                                                      192.16
                                                                243.42
1565
        0.01000
                    297.20
                              1.00000
                                          297.20
                                                    0.00100
                                                                          0.05000
                                                                                      189.64
1570
       0.01000
                    318.58
                              1,00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
                                                                                      201.21
1571
       0.01000
                    308.61
                              1.00000
                                          308.61
                                                    0.00100
                                                                252.26
                                                                          0.05000
                                                                                      196.09
1572
       0.01000
                    301.43
                              1 00000
                                          301.43
                                                    0 00100
                                                                246 73
                                                                          0.05000
                                                                                      192 22
                    297.20
                                          297.20
1573
                                                    0.00100
                                                                          0.05000
                              1.00000
                                                                243.42
                                                                                      189.64
       0.01000
1578
        0.01000
                    318.58
                              1.00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
                                                                                      201.21
                                                                252.60
1579
       0.01000
                    309.05
                              1.00000
                                          309.05
                                                    0.00100
                                                                          0.05000
                                                                                      196.32
1580
        0.01000
                    308.10
                              1.00000
                                          308.10
                                                    0.00100
                                                                251.87
                                                                          0.05000
1581
       0.01000
                    297.23
                              1.00000
                                          297.23
                                                    0.00100
                                                                243.44
                                                                          0.05000
                                                                                      189.66
1586
        0.01000
                    318.58
                              1.00000
                                          318.58
                                                    0.00100
                                                                259.90
                                                                          0.05000
                                                                                      201.21
1587
       0.01000
                    309.18
                              1.00000
                                          309.18
                                                    0.00100
                                                                252.70
                                                                          0.05000
                                                                                      196.39
                                                                251.87
1588
       0.01000
                              1.00000
                                          308.10
                                                    0.00100
                                                                          0.05000
                                                                                      195.82
                    308.10
1589
                    297.36
                              1.00000
                                          297.36
                                                    0.00100
                                                                243.55
                                                                          0.05000
        0.01000
                                                                                      189.75
1922
       0.01000
                    652.22
                              1.00000
                                          652.22
                                                    0.00100
                                                                537.55
                                                                          0.05000
                                                                                      423.34
                    649.18
                              1.00000
                                          649.18
                                                    0.00100
                                                                          0.05000
        0.01000
1924
       0.01000
                    651 00
                             1 00000
                                          651 00
                                                    0 00100
                                                                536 97
                                                                          0.05000
                                                                                      423 39
```

OPTIMIZATION SYSTEM FOR TPSSYM = 28

```
TOTAL NUMBER OF DESIGN VARIABLES = 32
TOTAL NUMBER OF CONSTRAINS = 480
TOTAL NUMBER OF TEMP. CONSTRAINS = 416
TOTAL NUMBER OF TEMP. PRINTOUTS = 13
```



```
-1.0 +
                      .28 .38 .48
      .08
                .18
                                                       .58 .68
TIME ( X 1.401E-44 )
                                                                                  .78
                                                                                             .88
                                                                                                         .98
                                                                                                                  1.08
             MAXIMUM TEMPERATURE OF EVERY LAYER
LAYER: 1 2 3 4
Tmax: 2300.33 2300.33 550.33 600.33
Optv: 1219.31 1219.31 545.73 545.73
                  VALUES OF DESIGN VARIABLES :
                DEV02
                        DEV03
                                DEV04
                                        DEV05
  1 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000
     1.34764 1.42937
                      1.08076 1.29944 1.10274
                                               1.23235
                                                       1.04155
   3 0.02953 0.02847 0.04056 0.03056 0.03218 0.02901 0.03729 0.03405
   4 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000 0.05000
THE ORIGINAL OBJECTIVE FUNCTION =
                                   47.4986687
THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = 0.4382748
THE TOTAL OPTIMAL WEIGHT = 3.14044217E+03
MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES
  X 0.8747E+01
1.0 +
 -1.0 +
               .13 .23 .33 .43 .53 .63
TIME ( X 5.605E-44 )
                                                                         .63 .73 .83
                                                                                                     .93
                                                                                                                 1.03
            OPTIMAL STRUCTURES OF TPS FOR PATCH = 28
 (WITH AVERAGE THICKNESS)
                    HRSI COAT
                                       thin skin
                                                          0.01000 in. 1219.3 F
 ______
                                                          ----
                    LI-900 (P)
                                       slab
                                                          1.20719 in. 1219.3 F
                   RTV-560 thin skin
                    17 LB SIP .16 IN
                                                          0.05000 in. 545.7 F
 -----
         THICKNESS AND TEMPERATURE OF LAYERS FOR PATCH =
                                                         28
  PANEL
         LAYER01
                            LAYER02
                                               LAYER03
   1858
         0.01000
                   1041.89
                            1.04155
                                     1041.89
                                               0.03729
                                                         550.33
                                                                 0.05000
                                                                           544.25
   1859
          0.01000
                   1048.10
                                     1048.10
                                               0.03628
                                                         550.33
   1860
          0.01000
                   1054.82
1061.78
                            1.09491
                                     1054.82
                                               0.03518
                                                         550.33
550.33
                                                                 0.05000
                                                                           544 74
                           1.12364
                                     1061.78
                                               0.03405
                                                                           545.01
   1861
          0.01000
                                                                 0.05000
                   1039.44
1058.31
                           1.10274
1.14014
                                     1039.44
1058.31
                                              0.03218
0.03119
                                                         550.33
550.33
   1866
          0.01000
                                                                 0.05000
                                                                           542.08
          0.01000
                                                                 0.05000
                                                                           542.88
   1867
   1868
          0.01000
                   1081.24
                            1.18408
                                     1081.24
                                               0.03013
                                                         550.33
                                                                 0.05000
                                                                           543.85
                   1106.72
1080.80
                           1.23235
1.08076
                                     1106.72
1080.80
                                                         550.33
550.33
   1869
          0.01000
                                               0.02901
                                                                 0.05000
                                                                           544.93
          0.01000
                                               0.04056
                                                                 0.05000
   1874
                                                                           543.76
   1875
          0.01000
                   1097.88
1120.13
                            1.14010
                                     1097.88
                                               0.03773
                                                         550.33
                                                                 0.05000
                                                                           543.73
                            1.21417
   1876
          0.01000
                                     1120.13
                                               0.03435
                                                         550.33
                                                                 0.05000
                                                                           543.72
   1877
          0.01000
                   1146.25
                            1.29944
                                     1146.25
                                               0.03056
                                                         550.33
                                                                 0.05000
         0.01000
                   1167.96
                            1.34764
                                     1167.96
                                              0.02953
                                                         550.33
                                                                 0.05000
                                                                           543.91
   1882
                            1.36866
   1884
        0.01000
                  1199.85 1.39687
                                     1199.85
                                               0.02901
                                                         550.33 0.05000
                                                                           545.06
```

1885 0.01000 1219.31 1.42937 1219.31 0.02847 550.33 0.05000 545.73 OPTIMIZATION SYSTEM FOR TPSSYM = TOTAL NUMBER OF DESIGN VARIABLES = 80 TOTAL NUMBER OF CONSTRAINS = 1640
TOTAL NUMBER OF TEMP. CONSTRAINS = 1040
TOTAL NUMBER OF TEMP. PRINTOUTS = 13 MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.1154E+04 1.0 B R В В В C C В Е C В Ε Ε Ε 0.0 -1.0 + .58 .68 TIME (X 1.401E-44) .08 .18 .28 .38 .78 .88 .98 1.08 MAXIMUM TEMPERATURE OF EVERY LAYER LAYER: 1 2 3 4 2800.33 2900.33 2700.33 550.33 Tmax: Optv: 1153.58 1153.58 750.62 357.76 357.76 VALUES OF DESIGN VARIABLES : LAYER DEV01 DEV02 DEV03 DEV04 DEV05 DEV06 DEV07 DEV08 DEV09 DEV10 DEV11 DEV12 DEV13 DEV15 DEV16 DEV14 1 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 0.01000 2 0.01000 0.01 1.00000 1.00000 1.00000 4 0.00100 0.00 0.05000 0.05000 0.05000 THE ORIGINAL OBJECTIVE FUNCTION = 1618.3453369 THE RATIO OF OPTIMAL OBJECTIVE FUNCTION = THE TOTAL OPTIMAL WEIGHT = 1.53156968E+04 MAXIMUM TEMPERATURE OF EACH LAYER VS OUTPUT TIMES X 0.1098E+00 1.0 A 0.0 -1.0 + 1.00 1.50 1.60 TIME (X 0.000E+00) 1.30 1.70 1.80 1.90 2.00

29

OPTIMAL STRUCTURES OF TPS FOR PATCH =

(WITH AVERAGE THICKNESS)

(WITH AVERAGE THICKNESS)												
	ACC((N) thin skin					0.01000 in. 1153.6 F						
	0.03000 in. ZIRCONIUM					:= i						
						- i						
	radiation gap						i 0.01000 in. 1153.6 F					
	0.03000	- i i										
=======	=======	=======	=======		=======	:= i						
	LI-2200 (N) slab						0.99980 in. 750.6 F					
					========							
	RTV-560 thin skin						00 in. 35	7.8 F				
						i						
		17 LB S	SIP .16 IN	slab		0.04999 in. 357.8 F i						
=======	=======	=======	=======		=======	=						
	THICKNESS	AND TEMPER	RATURE OF 1	LAYERS FOR	PATCH =	29						
PANEL	LAYER01	1100 20	LAYER02	1100 20	LAYER03	007.63	LAYER04 0.00100	F10 26	LAYER05	224 45		
681 682	0.01001 0.01000	1109.29 1079.74	0.01000	1079.74	1.00007	907.63 876.57	0.00100	494.75		334.45 317.00		
683 684	0.01000 0.01000	1001.62 952.86	0.01000 0.01000	1001.62 952.86		801.38 756.06		442.91 412.62		283.69 265.99		
685	0.01000	1055.95		1055.95	1.00049	854.93		478.30		305.25		
686 687	0.01000	1013.02 917.23		1013.02 917.23		810.84 719.16		446.42	0.05000 0.04999	284.37 248.49		
688	0.01000	887.16				691.35		367.19		238.83		
689 690	0.01000 0.01000	1015.81 962.41		1015.81 962.41	1.00041	816.66 761.21	0.00100	449.94 409.31	0.05002 0.05000	284.29 258.94		
691	0.01000	865.09		865.09		667.21		346.95		224.09		
692 693	0.01000	821.33 981.25	0.01000 0.01000	821.33 981.25		626.97 784.49	0.00100	322.16 426.51	0.05000 0.05001	211.71 266.15		
694	0.01000	931.91		931.91		732.16			0.05001	241.88		
695 696	0.01000 0.01000	839.68 757.34	0.01000	839.68 757.34		640.92 564.70	0.00100 0.00100	325.07 278.73	0.05000 0.05000	207.75 185.40		
697	0.01000	959.47	0.01000	959.47	1.00000	764.53	0.00100	412.13	0.05000	254.67		
698 699	0.01000 0.01000	919.38 835.09		919.38 835.09		722.32 635.80	0.00100 0.00100	379.46 317.74	0.05000 0.05000	233.66 198.98		
700	0.01000	692.35	0.01000	692.35	1.00000	501.71	0.00100	234.89	0.05000	158.72		
835 836	0.01000 0.01000	1142.26 1153.58		1142.26 1153.58		939.04 950.29	0.00100 0.00100	544.36 550.33	0.05000 0.05000	352.90 357.76		
837	0.01000	1153.58	0.01000	1153.58	0.99999	950.29	0.00100	550.33	0.05000	357.76		
838 839	0.01000 0.01000	1151.78 1130.15		1151.78 1130.15		947.27 926.19	0.00100 0.00100	550.33 535.93	0.05000 0.05000	357.76 349.66		
840	0.01000	1102.67		1102.67	1.00000	899.46	0.00100	516.11		335.97		
841 842	0.01000 0.01000	1073.63 1046.24	0.01000	1073.63 1046.24		871.65 845.48	0.00100 0.00100	495.68 476.54	0.05000 0.04999	321.62 308.14		
843 844	0.01000 0.01000	1024.43 1012.19	0.01000	1024.43 1012.19		824.70 813.08	0.00100	461.47 453.25	0.04998 0.04998	297.58 292.01		
845	0.01000	1153.58	0.01000	1153.58		950.29	0.00100	550.33	0.05002	357.76		
846 847	0.01000 0.01000	1153.58 1153.58	0.01000 0.01000	1153.58 1153.58	1.00014 0.99961	950.29 950.29	0.00100	550.33 550.33	0.05001 0.04998	357.76 357.76		
848	0.00999	1153.58	0.00999	1153.58		950.29	0.00100	550.33		357.76		
849 850	0.00998	1153.58 1118.67	0.00998 0.00998	1153.58 1118.67		950.29 916.41	0.00100 0.00100	550.33 529.91	0.04992 0.04989	357.76 345.68		
851	0.00997	1081.00	0.00997	1081.00	0.99728	879.64	0.00100	503.30	0.04986	327.08		
852 853	0.00997 0.00997	1045.65 1018.24	0.00997 0.00997	1045.65 1018.24	0.99702 0.99704	845.12 818.27	0.00100 0.00100	478.12 458.35	0.04985 0.04985	309.44 295.55		
854	0.00997	1004.27	0.00997	1004.27	0.99740	804.48	0.00100	447.90	0.04987	288.22		
855 856	0.01000 0.01000	1134.18 1153.58	0.01000 0.01000	1134.18 1153.58	0.99978 0.99958	930.08 950.29	0.00100	534.94 550.33	0.04999 0.04998	343.90 357.76		
857	0.00999	1153.58	0.00999	1153.58	0.99936	950.29	0.00100	550.33	0.04997	357.76		
858 859	0.00999	1153.58 1153.58	0.00999	1153.58 1153.58	0.99915 0.99896	950.29 950.29	0.00100	550.33 550.33	0.04996 0.04995	357.76 357.76		
860	0.00999	1121.99	0.00999	1121.99	0.99880 0.99868	919.22	0.00100	530.43	0.04994	344.40 323.89		
861 862	0.00999 0.00999	1077.00 1034.96	0.00999 0.00999	1077.00 1034.96	0.99868	874.96 833.42	0.00100 0.00100	498.39 468.13	0.04993 0.04993	323.89		
863 864	0.00999	1003.19 988.78	0.00999	1003.19 988.78	0.99863 0.99876	801.83 787.25	0.00100	444.91 433.92	0.04993 0.04994	289.29 281.94		
865	0.01000	1046.99	0.01000	1046.99	1.00000	850.02	0.00100	479.09	0.05000	305.12		
866 867	0.01000 0.01000	1122.95 1153.58	0.01000 0.01000	1122.95 1153.58	1.00000	928.38 950.29	0.00100	535.48 550.33	0.05000 0.05000	337.16 352.17		
868	0.01000	1153.58	0.01000	1153.58	1.00000	950.29	0.00100	550.33	0.05000	353.63		
869 870	0.01000 0.01000	1134.37 1094.98	0.01000 0.01000	1134.37 1094.98	1.00000	950.29 922.80	0.00100 0.00100	550.33 540.19	0.05000	345.00 329.75		
871	0.01000	1050.44	0.01000	1050.44	0.99999	879.98	0.00100	510.78	0.05000	312.10		
872 873	0.01000 0.01000	1007.55 975.23	0.01000 0.01000	1007.55 975.23	1.00001	836.22 800.29	0.00100 0.00100	479.55 452.67	0.05000 0.05000	294.47 280.53		
874	0.01000	962.10	0.01000	962.10	1.00004	781.01	0.00100	436.60	0.05000	274.00		
1258 1259	0.01000 0.00999	968.69 993.30	0.01000 0.00999	968.69 993.30	1.00005 0.99902	783.09 791.49	0.00100 0.00100	436.41 436.65	0.05000 0.04995	275.97 283.44		
1260	0.00998	1005.95	0.00998	1005.95	0.99796	805.94	0.00100	448.56	0.04990	288.70		
1261 1262	0.01000 0.01000	1011.76 984.12	0.01000 0.01000	1011.76 984.12	0.99979 1.00005	812.58 795.64	0.00100 0.00100	453.08 444.37	0.04999 0.05000	292.43 281.96		
1263	0.00999	1006.08	0.00999	1006.08	0.99930	803.99	0.00100	445.48	0.04996	288.94		
1264 1265	0.00998 0.01000	1014.02 1016.13	0.00998 0.01000	1014.02 1016.13	0.99848 0.99999	813.62 816.61	0.00100 0.00100	453.81 456.18	0.04992 0.05000	292.47 295.25		

1266	0.01000	1012.56	0.01000	1012.56	1.00002	818.60	0.00100	458.73	0.05000	292.96
1267	0.01000	1029.12	0.01000	1029.12	0.99963	826.51	0.00100	461.54	0.04998	299.13
1268	0.00999	1028.89	0.00999	1028.89	0.99916	827.87	0.00100	463.81	0.04996	299.64
1269	0.01000	1024.49	0.01000	1024.49	1.00000	824.80	0.00100	462.64	0.05000	300.15
1270	0.01000	1055.88	0.01000	1055.88	1.00000	852.66	0.00100	479.40	0.05000	309.35
1271	0.01000	1064.44	0.01000	1064.44	1.00000	860.96	0.00100	486.18	0.05000	314.87
1272	0.01000	1051.93	0.01000	1051.93	1.00000	849.91	0.00100	479.33	0.05000	310.78
1273	0.01000	1037.24	0.01000	1037.24	1.00000	837.27	0.00100	472.33	0.05000	307.37

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